NUFACTURE

FOOD MANUFACTURE

...ITED, 12, STRATFORD PLACE, LONDON, W.1. ...JANUARY, 1948

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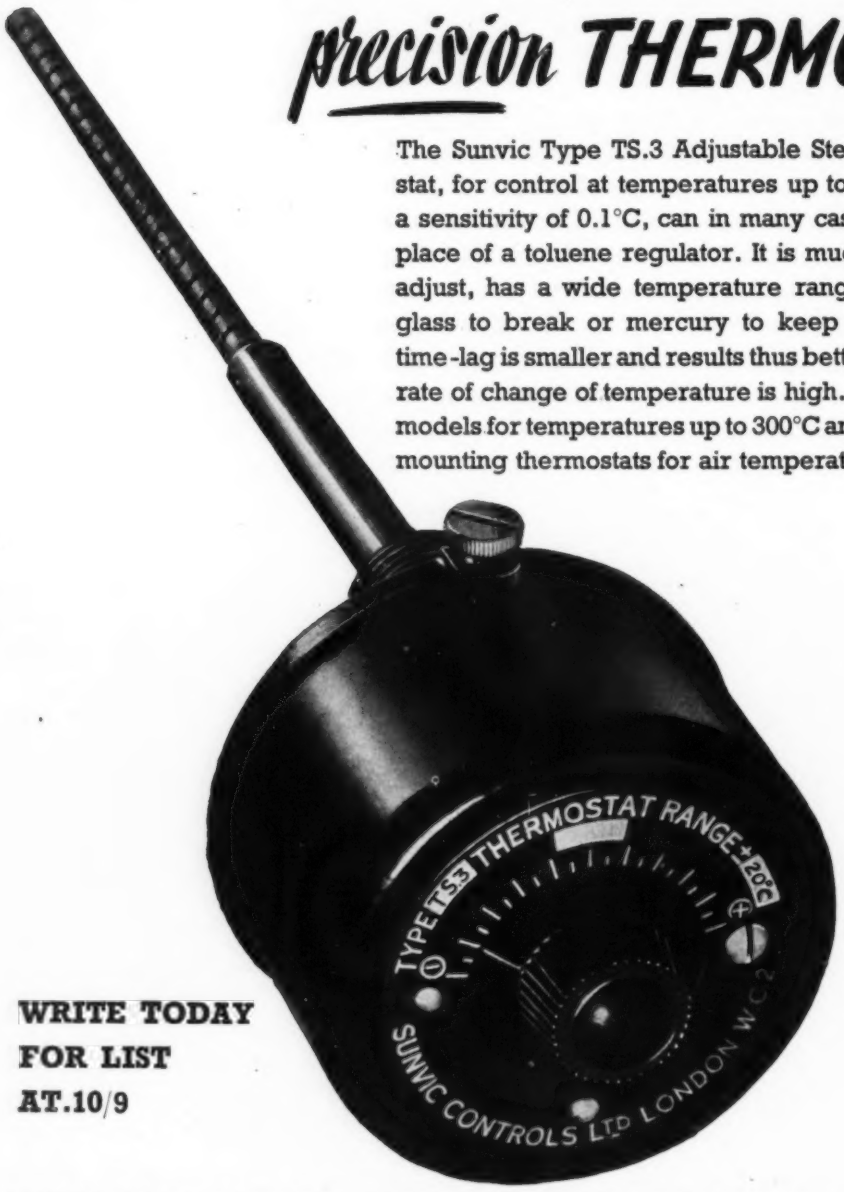

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FOOD MANUFACTURE

Vol. XXIII, No. 1 January 1, 1948

1948

OUR pious New Year resolutions having been made, we read in Anton Tchekhof's *Note-Books*: "We fret ourselves to reform life, in order that posterity may be happy, and posterity will say as usual 'in the past it used to be better, the present is worse than the past'"—which contains a grain of philosophy.

We shall endeavour to forget the past year—its *débâcles*, its bickerings and its discomforts. They may point a moral or two, if they do not adorn a tale. As to the New Year, it is impossible for the non-specialist—much more so for the specialists if their arguments among themselves are any criterion—to formulate a tidy assessment of its trends. In a fragment from *Ulysses* perhaps may be found the temper in which we might face them.

> We are not now that strength which in old days
> Moved earth and heaven, that which we are, we are—
> One equal temper of heroic hearts,
> Made weak by time and fate, but strong in will
> To strive, to seek, to find, and not to yield.

Wheat and American Relief Plans

Now that the wheat prospects for 1947-1948 are becoming only too clear to the consuming nations, attention is turning to the doubful 1948 harvest in the U.S.A. At time of writing the position is not an auspicious one. The Harriman Committee report that the grain stock situation is serious; and it admits that minimum export commitments, even for the coming year, rest upon the presumption that the U.S.A. will experience good weather conditions over the next three crop years. But there has been drought throughout the wheat belt; and so far plantings cover less than one-half the planned acreage for the 1948 crop. Heavy rains are needed, if a low yield next year is to be avoided.

There are several factors for which allowance has to be made. The low stocks in the U.S.A. would in any case have persuaded the Government to look to its granaries before committing itself to a heavy export programme; and this is demonstrated by the cut in wheat exports for the winter months. But if the country is to experience a series of poor harvests, the whole relief scheme will obviously be threatened. The suggestion made by the Harriman Committee, that exports rather than domestic demands have been the real cause of the inflationary movement, is not likely to make the American consumer more complacent in the matter of food prices. Indeed, there is already some pressure to get a limit placed on the price of meat and other live stock products before they tempt the stock farmer to eat into the National grain reserves. It has been further suggested that the marketing of over-fat stock should be penalised by nicely adjusted price schedules. Such measures, it is contended, would slow down the feeding of wheat to stock, that is the inevitable consequence of the high maize prices. Clearly, the utilisation of wheat on this scale (one estimate gave the likely disappearance of wheat in this way as 9 million tons) would plainly waste the world's grain resources to an alarming extent. Unfortunately, any preventive measures that could be devised would mean a large amount of supervision; and with food prices where they are, farmers and dealers can presumably find a way through any but the most rigid inspection system.

Meanwhile, the moral commitments of the United States for relief overseas continue to grow rather than to diminish. Some of these commitments, such as those to France and Italy, are clearly affected by political considerations; and it becomes obvious that the Marshall Plan will be carried to success as much along the pipe-line of grain deliveries as along the flow of Mr. Marshall's own eloquence. Beyond it all lies Japan. Though Japanese estimates may well be suspect, it can be assumed that the country has a non-rural population of about 44,000,000. This body

of consumers is now dependent on 35,000,000 peasant producers; and the food situation appears to be at the best precarious. One statement gives the import requirements for 1947-1948 as of the order of 1,800,000 tons of grain and other foods. There is no source from which this quantity of grain could be drawn save the United States; and whether the proposed relief measures for China are also to be expressed in terms of grain no one has yet revealed. In short, mathematics of maize and wheat seem to be too complicated by now for any but an American statistician to tackle.

Nationalisation of the Fishing Industry

The creation of a series of regional ports around Britain, to which the industry would be centralised, is planned by the Government as part of their policy of nationalisation of the fishing industry. Some advance indication of the trend of thought has been given by Mr. J. J. Robertson, M.P., Secretary of State for Scotland, himself a former fisherman, who spoke on the development of quick freezing and regional processing at a recent cruiser trial on the Firth of Forth.

The fishing end of the industry is to be left to operate undisturbed but there is a need, he said, for nationalisation of the marketing industry. Too many unnecessary workers were engaged in the distribution and handling of fish, and legislation is to be introduced during the present session of Parliament to deal with this.

At these regional ports, serving a given fishing area, processing equipment of various types will be located. Cold stores, quick freeze plant, canning, and other units are to be built to convert quickly the fish brought in by the fleet located at that port or area.

These plans will demand a capital expenditure which cannot be found by private enterprise and the Government will, according to Mr. Robertson, take over responsibility for the marketing and distributive end of the trade. He also indicated that plans are progressing for the equipment of large white fish trawlers with quick freeze equipment so that fish caught by the fleet may be processed at sea and brought to the regional port for storage and for distribution.

Starvation versus Sufficiency

The Hunterian Society met on November 17 with Mr. Alexander Roche, the President, in the chair, to debate the motion that our present diet is undermining the health of the nation.

Dr. Franklin Bicknell returned to the fray and disagreed with the thesis that unrationed foods and food taken at restaurants filled the gap between calories required and calories available. He proceeded to explain why in his opinion, while the nation was undernourished, there were no frank signs of malnutrition. Weight, he suggested, was maintained because the body conserved itself by allowing less work to be done. It was true that mortality rates had not risen. In recent years, however, there had been advances in prophylaxis, in maternity and child welfare, and in treatment through the introduction of chemotherapy. Why then were the figures not greatly reduced? Because our rotten diet was wiping out all the benefits. As to morbidity, the incidence of infections involving the eyes and skin had risen; convalescents were taking longer to recover; morals were impaired; tiredness was a ubiquitous symptom. This deterioration was attributable to bad food, and particularly to lack of fat.

Dr. Bicknell found it noteworthy that neither of the two principal speakers against the motion were medical men. "To us doctors," he concluded, "the nation is ill."

Sir Jack Drummond, F.R.S., in opposing the motion, submitted that there was no certain evidence that the nation was now less well nourished than in 1938. Referring to pre-war food, he said there had been enough to yield an overall average of 3,000 Calories a day, but a third, if not a half, of the population had been underfed. The war had equalised sacrifice, and in recent years there had been very little difference between the calorie intake of different classes.

Sir Jack considered that Dr. Bicknell had belittled the scientific approach to the distribution of food, but the relief of Europe and the nutrition of Britain in the war had been undertaken with cold-blooded scientific analysis and it had succeeded. Additional fat and meat was simply not to be had because of the world shortage. Naturally the people of Britain were tired out at the end of the war and it was also natural that they should flock to doctors. But vital statistics were the most sensitive indices of health; all had improved since 1940 and none had gone back. There was moreover, less anaemia in women, less rickets, and less caries; and the growth of children had increased.

Sir Jack agreed that the rationing of potatoes was a serious blow and that the position was precarious. However, a calorie shortage did not threaten health, provided that there was no major dietary deficiency. Its main effect would be to lower production. The heavy worker and adolescents would go hungry; they would work less and they would lose weight, but their health would not be undermined. Judging by observations in Continental countries, when times improved they would pick up without demonstrable ill health.

Dr. McFadyean, in supporting the motion, admitted that children of school age, expectant mothers, miners and dock workers were well enough fed, but wanted someone to tell him how many women in the last four years had nursed their babies for more than four weeks. He gave a depressing list of increasing prevalence of gastro-enteritis, impetigo, epidermophytosis, sycosis barbae, and inflammation of the eye, chronic rheumatic infections, and patches of choroid degeneration in the young and otherwise healthy.

Dr. Pyke, on the other hand, disputed the admissibility of dismissing the quantity of sausages, offal, and meat pies as negligible. Since 1941 surveys had shown consumption per head in the home to be steady at 2,300 Calories. Speakers for the motion had confused average amounts per head with amounts per man, and that 2,900 Calories suggested before the war as a desirable intake for an unemployed man had been a man value. The present overall average of 2,700 Calories, continued Dr. Pyke, was compatible with full vigour. Only 72 per cent. of this was obtained from the rations, the remainder being derived from unrationed foods in the home or from restaurant or canteen meals. No one liked the diet, but a diet that was disliked did not necessarily malnourish the consumer. In Germany there had been complaints of starvation and propaganda on dietetic insufficiency was similar to that in this country, but recent detailed clinical and nutritional surveys in Germany had not substantiated the complaints.

During the discussion that followed, Sir Jack Drummond held that no concrete facts had been produced in support of the claim that the country was undernourished. He made the interesting point that in 1940, when it was announced that calcium was to be added to flour, many doctors, some of them distinguished, immediately wrote and continued to write, complaining that this addition was causing illness. Yet actually, owing to supply difficulties, calcium was not added until eighteen months later, by which time all complaints had ceased, never to be resumed.

The motion being put to the house, those in favour of starvation outnumbered those against by about three to one. The question we should now like to ask the majority is, what is going to be done about it?

Yerba Maté

Those who have experienced the remarkable sensation of euphoria as a result of early morning sips of maté tea may be interested in this product, especially as it is again appearing in the shop windows—interest that may be accentuated by empty teapots towards the end of the rationing period.

It was the Guarani Indians who taught the Jesuit fathers in Paraguay and Brazil how to make a beverage of the maté by putting the powdered leaves in a dried gourd, pouring hot water over them and drinking the concoction from a tube of cane or bone. The Jesuit missionaries in the seventeenth century introduced its cultivation into northeastern Argentina, where they developed flourishing plantations, and maté is now grown to be one of the greatest products of the Argentine area of Misiones.

The leaves from the species *Ilex paraguariensis*, which grows in the form of a shrub, were prepared originally by very crude methods of drying, which consisted of burning fires underneath the trees and drying leaves on the branches, but they are now taken to the factory where they are heated, carefully sieved and passed through blowers before being separated into grades for use. More modern methods are used in curing, grinding, and packing the leaves.

Yerba maté is produced commercially in three South American countries—Brazil, Argentina, and Paraguay. Production for the three countries in 1943 was about 373 million pounds and consumption for Argentina alone usually averages 243 million pounds annually.

The existing tea ration may be eked out by the addition of maté. The blend is reminiscent of China tea and as this is, or should be, taken without milk, the maté has the double advantage of effecting economy of two scarce commodities.

Herring Shoal Location

The investigation into the use of Asdic equipment to locate shoals (reported in FOOD MANUFACTURE, 21, 8, 322) has proved of less value than was hoped.

The official report suggests that it is doubtful whether Asdic will prove of commercial value in general fishing practice although its use for specialised craft is possible. Experts who have been engaged on a year's experimental work on one of the latest fishing vessels in this country indicated that although they have radar on board they have no scientific devices to locate shoals.

It might not be wise to claim that fishermen are in general opposed to scientific devices, especially in view of the current trend to modernisation of fishing vessels and the inclusion of many new items of equipment, but it cannot be denied that, to date, shoal location devices have not secured the necessary confidence to justify their general adoption. An interesting point in this connexion is the reference by a Clyde herring skipper to the use of piano wire as a detection device. A heavy weight was attached to the wire which was trailed clear of the vessel, the vibration caused by the impact of the herring on the wire warning the experienced watcher of the presence of shoals. Whether any development on these lines is possible remains to be demonstrated, meanwhile reliance on scientific equipment for this purpose has been somewhat discouraged

Smugglers' Cave—Modern Style

In Glasgow Sheriff Court recently a case was heard which contained some ingredients of the conventional thriller. A "fireplace maker" was prosecuted for contraventions of food rationing orders and the manufacture of wafers without a licence.

These nefarious operations were conducted in two rooms which had been bricked off so that they could only be entered by way of a sideboard. Inside these rooms were female employees, vats for melting chocolate, stocks of raw materials, empty biscuit tins, and a complete set-up for the manufacture of chocolate nougat wafers.

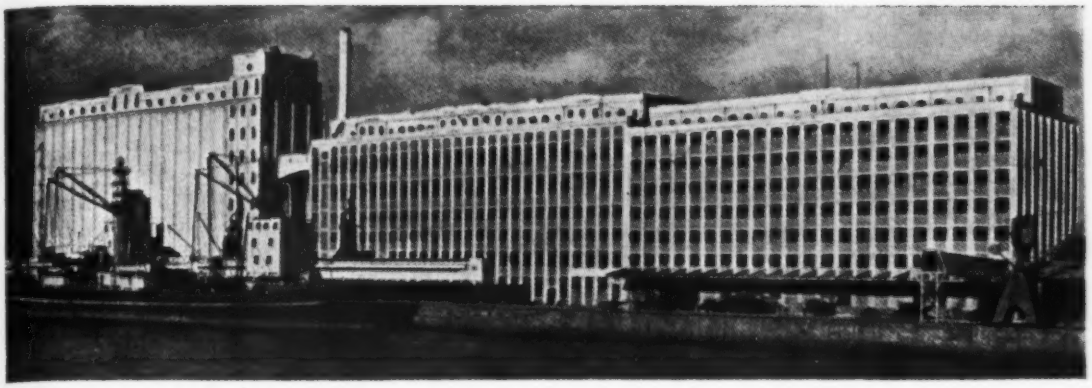
Emerging from the sideboard cupboard, the sleuths engaged on the investigation, doubtless following the best traditions of Sherlock Holmes, found a garage with a concealed underground chamber containing stocks of sugar and other rationed foods for which no licences had been granted.

In the face of this damning evidence, this ingenious fireplace maker—turned food manufacturer—pleaded guilty, explaining that he was compelled through shortage of accommodation to carry out the business at his home and that the "alleged" concealment was to prevent the aroma of chocolate from permeating the house.

Hot Chestnuts

Now that roast potatoes become more of a luxury, what more welcome sight and smell and feeling of radiant warmth than the oven of the chestnut-vendor on the street corner! Time was when our digestive powers, at least of we older ones, curbed the desire to sample such wares of different degrees of carbonisation; we knew too well, after rolling the hot nuts in our numb hands and peeling off their jackets, how some would be underdone and others charred on one side, with always the chance of a bad nut or two to deter anyone except the youngsters. But in these cheerless days, we go for anything off the ration; or if there be a coal fire at home, then a few chestnuts popping off provide one way of entertaining the children in that restless zero hour before bedtime.

After they have gone, the study chair is the spot to try and solve a curious point regarding chestnuts. When did they first pop up (or pop off) in this country? We hear of the Totworth chestnut tree as boundary mark in old King John's day; of chestnut trees long used to help the sprawling hop plant. There is William of Stratford causing his Petruchio to talk of "a chestnut in a farmer's fire," as the recent London production reminds us. But when the invader came here is just as vague as the first use of "pulling the chestnut from the fire with the cat's paw"—which goes back further than Molière's *L'Etourdi*. On the food side, when Isabella Beeton got going we soon had chestnut pudding, chestnut sauce and soup, stuffing and croquettes, as well as a special recipe for Chestnut Amber—which is in no way connected with ale. But none of your *marrons glacés* for Isabella! And none today for many of us, with the price at sixteen shillings a tin. We shall have to eschew the titbit of the gourmet and go back to plain chestnuts known to the Arcadians, to the roast chestnut of street corner in particular. We may call an old story too oft repeated a "chestnut." But we hold back the tag when the old encyclopaedia so topically tells us that chestnuts are food "for the poor of Europe."



A typical modern British port mill.

The Milling Industry

Progress in 1947

A. J. AMOS, Ph.D., B.Sc., F.R.I.C.

Although the second anniversary of the cessation of hostilities has come and gone, there has been no loosening of the reins controlling the milling industry; the millers continue yet to be the servants of the Government and not the masters of their industry. They are told what wheats they must use and in what proportions, how much flour they must obtain from these wheats, and the amount of vitamin B_1 that must be contained in this flour. In such circumstances the range of variation in flour quality is comparatively small and the scope for competitive enterprise considerably restricted. On the other hand, although technical ability cannot now be given so wide an expression as in the almost forgotten pre-control days, it has not lost in importance, since the production of good high extraction flour of prescribed vitamin content is a more exacting task than the milling of a pre-war type of low extraction flour.

THE bulk of our imported wheat came from Canada, and, as is usual, by far the majority of the Canadian arrivals consisted of Manitoba wheat. Whereas two years ago, however, the shipments of Manitoba wheat were confined almost entirely to grades No. 1 and No. 2, the 1947 Manitoba arrivals were spread over grades No. 1 to No. 4 inclusive. The wheats of the two top grades were well up to the standard expected in high-grade Manitoba and were well able to serve as the backbone of a bread grist. On the basis of average data the No. 2 grade wheat was inferior in bread-making quality to the top grade, but the difference was relatively small. The No. 3 grade, and particularly the No. 4 grade, samples were, of course, significantly below the standard of the two top grades in strength and protein content, but they were nevertheless wheats of useful strength and capable of carrying weak wheats in the blend. Their glutens did not exhibit the spring and life which is a feature of the glutens of the No. 1 and No. 2 grade wheats, but, on the other hand, they did not show that pronounced stiffness and "deadness" which has characterised the glutens of the lower grades in some past seasons.

During most months of 1947 Garnet wheat also

was imported from Canada. This wheat furnishes a gluten which is markedly stable and which possesses relatively poor stretching power, and it cannot therefore be used freely in a blend without leading to a deterioration in the dough properties of the resulting flour. The better samples of No. 1 grade Garnet fell within the range of No. 4 Manitoba in strength and protein content, but the poorer samples of the No. 3 grade Garnet were no stronger and no more proteinous than Plate wheat. These latter samples, although not needing support from stronger wheats, would certainly not carry any weaker wheat in the blend.

Durum was another variety of wheat which was shipped from Canada during several months of the year. The physical properties of the gluten from this wheat were very much like those of the gluten from Garnet, and the free use of Durum in a blend would have impaired the liveliness and distensibility of the dough furnished by the resulting flour. The average strength of the Durum arrivals, however, was inferior to that of the better grade Garnet wheats and more like that of the poorer samples of No. 3 Garnet.

Early in the year some Red Winter wheats were received. This wheat proved to be very similar in strength and protein content to Rosafe Plate wheat and as such was a fairly typical "filler."

American, Argentine, and Turkish Imports

From America we imported during the year Hard Winter wheat and to a smaller extent Northern Spring wheat. These two types differed appreciably in strength. The Northern Springs were usually in the Manitoba range of strength and, because of this and the general nature of their gluten, were often more or less on a par with No. 3 grade Manitoba. The Hard Winters, on the other hand, were often below the standard of good Plate wheat in strength. Thus, whereas the Northern Springs were able to carry some weak wheat and were therefore suitable for inclusion in the strong group of a grist, the Hard Winters were only moderate fillers.

During the latter half of the year wheat was imported from the Argentine. The strength and general baking value of these arrivals qualified them as "fillers" and indicated that they were the Rosafe type of Plate wheat.

About mid-summer a few cargoes of Turkish wheat were received. This wheat was of two types: one variety resembled Durum wheat in shape of kernel and was flinty in nature, whereas the other type showed rounder and plumper kernels. These wheats differed widely also in gluten properties; some samples exhibited a gluten which was markedly stiff and lacking in life, while others yielded a definitely distensible gluten. In all instances, however, the wheat was weak and well below the filler standard. The average strength was on a par with that of a typical Australian wheat.

English Wheat

During the first seven or eight months of the year, 1946 crop English wheat was, of course, being employed in the grist. Much of this wheat was high in diastatic activity, with the result that the "maltose figure" (an index of the diastatic activity) of most flours was significantly above 2 per cent. A number of flours were met with during this period which exhibited a sufficiently high diastatic activity to give rise to some stickiness in the dough and in the crumb of the baked bread. The 1947 crop native wheat, which began to arrive at the mills from August onwards, was very different in enzymic activity, as had been expected from the weather conditions which had prevailed during the summer. It showed an average maltose figure significantly below that of the 1946 crop, with the result that the maltose figures of bread-making flours began to fall. By the end of October the position was the very reverse of that existing early in the year in that flours from a number of mills revealed maltose figures below what is considered to be the minimum advisable for commercial work. Bakers meeting with these flours of low gassing power tended to be more than usually critical, because they had become accustomed to deal with flours which possessed high and even excessive gassing powers.

Protein Characteristics

The native wheat of the 1947 crop differed from that of the previous crop in not only moisture content and diastatic activity but also protein characteristics. Whereas the 1946 native wheat had yielded a distinctly distensible or flowy gluten, the 1947 English wheat gave a gluten which was less distensible than is usual for this type of wheat. Consequently the 1947 crop native wheat did not have the same toning down effect upon the strong and almost harsh glutens of certain strong wheats as did the English wheat of the 1946 crop, with the result that the doughs yielded by flours milled in the late summer of 1947 were distinctly more stable and noticeably less springy than those given by the flours produced earlier in the year. When the old crop wheat in the grist was being replaced by new crop the prescribed proportion of native wheat in the grist was 25 per cent., and at that level the difference in quality of the two crops had a significant effect. Bakers found that flour from grists containing 1947 native wheat tended to require

slightly more water, to "come through" rather more slowly, and to require rather more final proof than the flours from similar grists containing only old crop wheat. The change in dough behaviour in the direction of reduced liveliness, and a significant drop in diastatic activity which characterised flours at the change-over from old to new crop English wheat, was compensated for in a number of mills by the use of malt flour. Malt flour not only aided gas production through its diastatic enzymes but also contributed proteolytic enzymes to the flour, which lessened the tendency to stiffness and sluggishness in the dough.

Development of Musty Taint

During the early summer it is not unusual to find that some parcels of the native wheat which has been stored for nine or ten months since the previous harvest have developed a musty taint. In 1947 trouble of this nature was more pronounced than usual, possibly due to the unfavourable weather conditions at the harvesting period in 1946 and the unusually hot summer of 1947. Unfortunately the presence of such an out-of-condition taint passed unnoticed on some parcels of native wheat, with the result that the wheat was used in the bread-making grist. In such instances the musty taint was transferred to the flour and the flour thereby rendered unfit for bread-making. The taint was not always readily detected in the flour but became obtrusively apparent in the steam from the hot bread leaving the baker's oven.

Wheat Grists and Additions to Flour

The prescribed wheat grists have varied from time to time according to the situation with respect to wheat supplies, but have been patterned on those which have now been in force for several years. Usually minima for the proportion of native wheat and the proportion of imported wheat other than Manitoba were laid down on the understanding that the balance would be made up of Manitoba wheat. The prescribed minimum for the native wheat content of the blend was usually between 20 per cent. and 35 per cent., while the minimum for imported wheat other than Manitoba was 15 per cent. Exceptions were made in the grists intended for the production of flour suitable for use in Scotch sponge processes. In the strong sponging flour—the so-called "Springs" flour—the minimum proportion of native wheat was often only 10 per cent., while in the comparatively weak "doughing up" flour—the "Winters"—the minimum for the proportion of native wheat reached 50 per cent. to 60 per cent.

The rate of extraction remained at 85 per cent. throughout the year, but no reduction was made in the proportion of *creta praeparata* which millers were instructed to add to the flour; this continued at 14 oz. per sack (280 lb.), the level to which it had been raised in 1946, when for a short period the extraction became 90 per cent.

The addition of imported white flour to home-milled flour by the miller continued to be obligatory. The proportion in which such flour was required to be added to our bread flour was varied from time to time, but was usually between 10 per cent. and 20 per cent. for England and Wales. The proportion prescribed for mills in Scotland and Northern Ireland was usually 5 per cent. above the figure laid down for England and Wales.

The bulk of the imported flour used for mixing-in was either Canadian or American. The consignments of the former type were reasonably consistent in baking quality, but considerable variation was encountered among the imported American flours. Some of these revealed decidedly undesirable protein characteristics in that they yielded doughs which were dead and sluggish. The inclusion of 10 per cent. to 20 per cent. of such flour in a miller's flour had sufficient adverse effect upon dough behaviour to lead to criticism from bakers.

Self-Raising Flour

The introduction during the war of regulations respecting the aerating power of self-raising flour has led to this commodity being manufactured to a fairly well standardised formula. The current Self-Raising Flour Order requires that self-raising flour shall yield not less than 0·40 per cent. available carbon dioxide, but an available carbon dioxide content well above this limit is called for at the time of manufacture in order to allow for possible deterioration during an unpredictable storage period before retail sale. It has become common practice for self-raising manufacturers to use 3 lb. 4 oz. of sodium bicarbonate per sack of flour, an addition which yields a total carbon dioxide figure of 0·59 per cent. Assuming the presence in the self-raising flour of an adequate proportion of acid ingredient, this figure should correspond to an available carbon dioxide figure in the region of 0·55 per cent., a figure well above the prescribed minimum of 0·40 per cent. The carbon dioxide content of a sample of self-raising flour depends not only upon the proportions of aerating ingredients added to the batch, however, but also upon the uniformity of distribution of these chemicals throughout the flour. Numerous self-raising flour manufacturers have therefore adopted the practice of making frequent analytical checks upon the carbon dioxide content of their product.

The frequent analysis of self-raising flour rendered necessary by the introduction of a legal limit

for carbon dioxide content has emphasised the unsatisfactory nature of the "master mix" method. When sodium bicarbonate and an acid ingredient, particularly acid calcium phosphate, are present together in a high concentration in a mixture, as they are in a master mix, they readily react together with consequent loss of carbon dioxide even under normal atmospheric conditions. A self-raising flour made from a master mix which has been prepared a day or two in advance, as used to be the custom of some manufacturers, may well, therefore, be dangerously near the legal minimum for carbon dioxide content even at the time of manufacture.

During the war years considerable attention was paid to the presence in certain acid phosphates of undesirable proportions of fluorine. In 1946 the Ministry of Food summarised these studies in a recommendation that an Order be made prescribing a maximum limit for fluorine in acid phosphates intended for use in foodstuffs of 300 parts per million and in self-raising flour of eight parts per million. Following this recommendation, it has become a common practice to check the acid phosphates used in the preparation of self-raising flour for fluorine content.

Separation of Flour Constituents

Some of the large milling concerns in America, and also in Canada, are turning their attention to the utilisation of flour for purposes other than conversion into baked goods. The idea is to separate flour into its two major constituents—gluten and starch—and then to convert these into various products for which markets exist. The peculiar physical properties of gluten enable it to be separated comparatively easily from flour and in such a manner that the starch is left behind in the form of an aqueous suspension. The technology of the process has been intensively studied at one of the American Regional Laboratories.

The gluten obtained in this way would be employed for the manufacture of mono-sodium glutamate. This compound, which has a marked meaty taste, is used as a flavouring agent in soups, meat, and pastes, and there is apparently a great demand for it in America. The starch would probably not find a sale as such, and certainly not in the corn belt, but would be used for the production of various marketable degradation products, such as dextrose, sugar syrups, and dextrin adhesives.

Prepared Mixes

Another development which has occurred in the milling industry in America, and which will certainly follow in this country when circumstances permit, is the production of what are known as prepared mixes. These are mixtures designed for the home preparation of lines such as cakes, pie-crust, puddings, and biscuits, but to none of them need the housewife add anything but water. The ingredients of these mixes differ in kind and proportion according to the type of goods the mix is intended to produce and the firm manufacturing the mix, but the usual ingredients are flour, aerating ingredients, milk powder, dried egg, vegetable shortening, sugar, flavour, and colour. Obviously little progress in this promising field can be made in this country until there has been a considerable lightening of the restrictions on the use of the major ingredients.

The idea underlying these prepared mixes is not new, but they were not a practical possibility until the problem of ensuring that they had a satisfactory shelf life was solved. The solution arrived with the discovery of a method of manufacturing a fat which was highly resistant to the development of rancidity. More recently, however, this special fat has been replaced in certain of the prepared mixes by normal fat and an anti-oxidant.

There is no doubt that when circumstances permit the larger milling concerns in this country will follow the lead of the Americans and the prepared mix will become an accepted item of the flour trade.

New Standards for Flour Purity

During the last three or four years gradually increasing attention has been paid in America to the examination of foodstuffs by what is known as the micro-analytical technique. This test enables a count to be made of certain undesirable contaminants, and in particular of rodent hairs and insect fragments, and it is often referred to as the "filth test." A considerable amount of work has been done in this field with cereals and the baked products which are prepared from them, and the Food and Drugs Authorities in America have taken action against various cereal foods which in their opinion have contained an excessive amount of contamination of this type. Unfortunately, however, they have not divulged at what level they consider such contamination to become excessive.

The widespread attention which is being given to this aspect of food quality in America has aroused interest in the subject in this country and particularly in the cereal field. Investigations of various cereal products and prepared cereal foods are being actively pursued and reports of valuable progress are to be expected shortly. There is little doubt that an eventual outcome of investigations of foods by the micro-analytical technique in America and elsewhere will be the introduction of new measures of design and construction of premises and plant and new measures of treatment of materials in the cereal and other industries. As yet, however, there

are numerous facets of the problem as it applies to the cereal industries which call for investigation. For example, how does the rodent hair and insect fragment contamination of flour from new crop wheat compare with that of flour milled from old crop wheat of the same type which has been in store for, say, eight months? Also, in what degree is the purity of flour, as determined by the micro-analytical technique, influenced by the rate of extraction? Then, again, what is the degree of contamination of various types of ingredients, such as, for example, spices and dried fruits, which are commonly mixed with cereals in the production of various baked products? These and allied questions will undoubtedly be settled, but their solution entails considerable investigational work on the part of the chemist associated with the milling and baking industries.

Refining Seal Oil in South Africa

SUCCESSFUL pilot-plant experiments on the extraction and refining of seal oil have been carried out in a new South African sealing vessel, the S.S. *Gamtoos*, at Seal Island, Mossel Bay, following investigations at the Cold Storage and Dehydration Laboratories at Cape Town.

Hitherto the oil has been produced on the islands along the west and east coasts of Africa where the hunting of the seals is done. However, owing to the rocky nature of these islands and consequent transport difficulties, it has been economically impossible to install proper plant for the extraction of the oil. Now it is hoped that by using sealing vessels such as the *Gamtoos*, with extraction and refining plant aboard, these difficulties will be overcome and the fullest possible use made of all parts of the seal.

The seal bulls were shot on the island and not in the sea, because they immediately sink in the water and only float after one or two days, by which time they might be eaten by sharks or wash ashore. Moreover when the females come on to the island to breed, the bulls accompany them to mate and stay there till the breeding is over, usually towards the middle of March.

As it was impossible to get nearer than 200 yards from the island, the seals were shot from the vessel and then transported from land to ship. At first, experiments were performed to increase the buoyancy of dead seals by inflation before dragging them on a rope through the water on to the ship. This proved quite successful, but was not adopted. Instead, the dead seals were skinned on the island before transportation.

The skins, each with a layer of from 1 to 3 in. thick of blubber, and the carcasses were hauled by rope to the ship. The livers were cut into small pieces to get rid of the blood, sprinkled with borax, and introduced into a drum and sealed. The borax did not prove to be a good preservative, for after fourteen days the lids blew off, due to decomposition of the contents. The drums were shipped to Cape Town and sold to private firms for the extraction of oil rich in vitamins A and D. The oil content varies from 2·5 to 12 per cent.

Owing to the lack of shipping facilities carcasses were dumped about six miles from the island. In future, however, it is hoped that they may be turned into carcass meat.

The blubber with adhering meat was next removed from the skins, which were washed, salted, and later sent to tanneries for making handbags.

The blubber was later rendered down in retorts. This was done by first boiling water in the retort by steam injection, after which a known weight of blubber and a known weight of caustic soda were added. Steam was introduced again and the pressure increased to 40 lb. per sq. in.

The average weight of blubber per seal is 84 lb. and a full-grown seal has a weight of approximately 600 lb. During the early period of breeding, the bulls carry an optimum weight of blubber, which gradually decreases towards the end of the season.

The Cake and Biscuit Industry

THE recently published report of the executive committee of the British Cake and Biscuit Association for the year ended May 31, 1947, contains information on various matters to which the executive committee has given consideration during the year, among which are the following:

Baking Industries' Scholarship Fund; Baking Wages Council; Biscuit Delivery Pool; Biscuit Imports; Biscuit Industry Council; Biscuit Prices; British Baking Industries' Research Association; Cake and Flour Confectionery Prices; Deposit Charge on Biscuit Tins; Education; Educational Training Deferment; Flour Supplies; Fuel Supplies; Ingredient Costs; Ingredients for Biscuits, Cake and Flour Confectionery; Joint Council for the Cake and Flour Confectionery Industry; National Bakery Education Advisory Committee; National Joint Wages Council for the Biscuit Industry; Nationalisation of Road Transport; Night Baking; Peace-time Programme; Pudding Manufacture; Rationing of Cake and Flour Confectionery; Wage Regulations for Distributive Workers; Wholesale Discounts.

The minutes of the tenth annual general meeting of the Association, held on July 24, 1947, are included in the report, which also contains a complete list of members.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture* December 1, 1947, page 542.

No.	*Date.* 1947.	PRICE FIXATION ORDERS
2023	Sept. 18.	Order revoking the Flavouring Essences (Current Prices) Order, 1943.
2024	„ 19.	Order replacing the Fish Sales (Charges) Order, 1946 and all its amending Orders.
2032	„ 20.	Milk (Control and Maximum Prices) (Great Britain) Order, 1947. Revokes S.R. & O. 1945, No. 410; 1946, Nos. 959, 1148; 1947, Nos. 17, 1221.
2110	„ 29.	Order amending the Imported Canned Fish (Maximum Prices) Order, 1947.
2144	Oct. 3.	Order amending the Cheese (Control and Maximum Prices) Order, 1946.
2201	„ 14.	Sugar (Control and Maximum Prices) Order, 1947. Revokes S.R. & O. 1943, No. 1596; 1946, No. 1643; 1947, Nos. 442, 759.
2309	„ 29.	Order amending the Feedingstuffs (Maximum Prices) Order, 1946.
2375	Nov. 6.	Order amending the Onions Order, 1946.
2422	„ 12.	Order amending the Flour Confectionery (Control and Maximum Prices) Order, 1946.
		FRUIT
2328	Oct. 31.	Order revoking the Tomatoes Order, 1947, and the Tomatoes (Appointed Day) Order, 1947. Revokes S.R. & O. 1947, Nos. 822, 1423, 1810, 1928, 1936, 1896.
		INFANT MILK FOODS
2151	Oct. 6.	The Proprietary Infant Milk Foods Order, 1947.
		LABELLING
2001	Sept. 15.	Order amending the Labelling of Food Order, 1946. Permits a claim on a label and in an advertisement that butter is a natural source of vitamin A without requiring the quantity to be specified.
		MANUFACTURED AND PRE-PACKED FOODS
2329	Oct. 31.	Order amending the Manufactured and Pre-packed Foods (Control) Order, 1942. Revokes S.R. & O. 1945, No. 758.

No.	*Date.* 1947.	PICKLES AND SAUCES
2420	Nov. 12.	Order amending the Food (Restriction of Dealings) Order, 1943.
		POINTS RATIONING
2363	Nov. 6.	Order amending the Food (Points Rationing) Order, 1947.
		POTATOES
2240	Oct. 18.	Order amending the Potatoes (1947 Crop) (No. 2) Order, 1947.
2402	Nov. 8.	The Potatoes (Control of Supply) Order, 1947.
2440	„ 13.	Order amending the Potatoes (General Provision) Order, 1944.
2448	„ 14.	The Seed Potatoes (1947 Crop) Transport Order.
		PRESERVES
2033	Sept. 20.	Order amending the Preserves Order, 1947.
2366	Nov. 6.	Order amending the Preserves Order, 1947.
		RATIONING
2093	Sept. 26.	Food Rationing (General Provisions) Order, 1947 (General Licence) Order, 1947.
2094	„ 26.	Order amending the Sugar and Preserves (Rationing) Order, 1947.
2220	Oct. 16.	Order amending the Bacon (Rationing) Order, 1947.
		SOFT DRINKS
1891	Aug. 29.	Order amending the Soft Drinks Order, 1946.
		TOMATOES
1896	Aug. 29.	Tomatoes (Appointed Day) Order, 1947.
1936	Sept. 5.	Order amending the Tomatoes Order, 1947.
		VEGETABLES
2327	Oct. 31.	The Carrots (1947 Crop) (No. 2) Order. Revokes S.R. & O. 1947, No. 1305.
		WELFARE FOODS
2239	Oct. 18.	Order amending the Welfare Foods Order, 1947.

Social History of the Pure Food Laws

F. Le GROS CLARK, M.A.

Part II

BY 1874 it was clear that the Acts were defective in many respects, and a further Select Committee was appointed. The lack of agreed standards for adulteration or for the proportion of fats in milk had meant that the analysts were themselves tending to conflict in their reports. While many cases of fraud had indubitably been revealed, several reputable tradesmen had been injured; and if local complaints were moderate in tone, they were none the less insistent. The remuneration offered to analysts was frequently unattractive; and, moreover, the permissive nature of the Acts implied that they were by no means universally adopted. Out of 125 counties and boroughs only sixty had made appointments, though in London the ground had been fairly well covered.

The Problem of Supervision and Standards

On the report of this committee was based the Act of 1875, which repealed the previous Acts and has substantially controlled the practice of adulteration from that time forward. While this Act extended some protection to the trader, it was far more explicit in defining standards of adulteration, and it further made some reference both to the quality of food and to labelling. But until it was amended four years later, when the appointment of analysts was at last imposed as a duty upon the authorities, its terms tended to frustrate the work of analysts in several ways. The Act laid it down that no retailer should sell to the prejudice of the purchaser any food that was not of the quality or ingredients demanded. The question then arose legally whether an analyst was strictly a purchaser and could be prejudiced. The courts inclined to hold that the purchase must be made in the ordinary way of custom; but in 1879 a ruling made it clear that the analyst was to be deemed a purchaser, and this ruling is of public significance in that it established the principle that a public officer, using public funds for the purpose, could effectively represent the interests of the body of consumers. The community thus for the first time frankly handed over to experts the function of protecting the quality and wholesomeness of its food.

The worst period of adulteration was now over. For the next thirty or forty years the emergence of new products on the market, such as margarine and the use of new flavourings and colourings, demanded legislation, and there was some further attention to the precise nature of descriptions on labels. But the Acts were in the main effective and had the support of most of the reputable traders. It may, however, be recognised that other influences were at work to ensure the protection of food. The last quarter of the nineteenth century saw the development of the large food industries, and whatever be the case of the smaller trader or producer, these centralised industries have evidently little to gain from petty dishonesties. They depend for their success upon teams of competent research workers, and even if they are not (as many of them are) interested in the public welfare, they are restrained from the practice of adulteration by the elementary fact that too many people would know about it. It was the age of the small manufacturer, the emergent and competitive enterprise in the back street, that provided the conditions under which adulteration flourished. These small men had taken advantage of the spread of scientific knowledge; and, as the event showed, only the application of more science could finally deal with the perversion of science.

Negative Legislation

But until 1938 most of the legislation was strictly negative in character. It prohibited the adulteration of food with noxious flavourings and preservatives or with ingredients that would affect the quantity of the original food substance or would prejudice the purchaser. It made some reference to the extraction from the food of substances the purchaser might have expected to be present in it. Beyond that, save in the matter of milk, it did not venture far. No real attempt had yet been made to establish the standards of quality that should be reached by all foods in common use. Yet this was clearly the next logical stage in the process of reform.

From 1875 onwards various committees recommended that some attention be paid to the standards and definitions of foods; but until the committee that preceded the passing of the Act of 1938 no solution of the problem was attempted. Milk, butter, and margarine were the only foods that had been defined by the close of the century. The 1874 committee had considered that Parliament had no desire to interfere needlessly between buyer and seller by assisting the consumer to ascertain the real money value of any commodity. This principle

was sustained for twenty years, when a further committee ventured to suggest that a court of reference should be established to prescribe standards and levels of quality and purity. The Government of the day was not impressed, and the support given to the proposal by committees that sat in 1901 and 1903 was equally ineffective. Only in 1913 did a Bill at last find its way into the House that would, if it had been passed, have given powers to the Local Government Board to define any article of food for the purpose of the Act. But this Bill made no progress, and when war came it was finally dropped.

A Prelude to the 1938 Act

There the matter seems to have rested, until in 1934 a Departmental Committee was appointed to report upon the working of the Acts and upon the composition and description of food. The Committee heard evidence and suggested that the time had come for the Acts to be revised and consolidated. It recommended that the law should be so altered as to enable definitions or standards to be prescribed; and it went on to propose that, for the purpose of evidence as to the quality of a food, claims made in advertisements should be treated as part of the package label. The idea of standards was less unfamiliar by this time than it had been in the early years of the century; voluntary grade designations were already in use for several commodities.

The evidence given before this Committee makes it clear that on the whole the Acts had been working smoothly. It was agreed, however, that a definition of ingredients would be useful, provided that the practice did not become so rigid as to limit the scope of experimentation in manufacturing methods. The Committee adopted a balanced view. The public should, it felt, know what they were getting; the same term should always mean the same thing. But flavour and general quality could hardly be standardised. Moreover, the quality of some foods might actually be lowered to the standard prescribed by law, and, on the other hand, some cheaper brands might be driven off the market if they fell below the standard. There was, said the Committee, no evidence that malnutrition had resulted from a lack of adequate standards.

But this was surely in some ways the crucial problem. The 1934 Committee sat at a time when the idea of vitamin and mineral deficiencies was much under discussion in the press and among the public; and, while it had been agreed that the customer has a right to a guarantee that the food ingredients are of the quality he demands, it was not yet quite clear that he required the State to protect him from a possible vitamin or mineral deficiency. The reformist movement of the day did not press the matter; it preferred to concentrate on securing for the low-income groups of the community a sufficient income to enable them to purchase an adequate diet in the prospect that a more ample diet would somehow cover the deficiencies.

Regulation of Quality

The 1938 Act, that was based upon the work of this Committee, was essentially a consolidating measure. Several old Acts were repealed, and the provisions of thirty-six distinct Acts were included in a Bill of a little over a hundred clauses. The Act did not, however, come into operation until after the outbreak of war in 1939, and by that time the Ministry of Food was already in existence. The situation had changed. It would in the view of some observers have been no less desirable to protect the public against dietary deficiencies in peacetime than it was in time of war. But the war gradually drew the biochemist, with the weight of nutritional science behind him, into a strategic position as the direct adviser of the Minister of Food, who obviously had to interpret the 1938 Act to meet the new problems confronting him. Food supplies were now being calculated not merely in terms of their energy and protein values, but in terms of their sufficiency in mineral and vitamin content. It soon became clear that, in the prevailing shortage of food, the public should be protected against a possible deterioration in the nutritional quality of various manufactured foods. There was more than a risk that exaggerated claims would be made for the value of their products by a number of fraudulent firms, and the revelation of practices of this nature gave occasion for uneasiness not only to the Ministry but to all the reputable manufacturers. Moreover, enquiries made abroad in the course of 1942 showed that our own country was by no means the most efficient among the countries of the world in regulating the quality of the foods to be sold by retail.

War and the Quality of Food

An Order had already been issued in 1941 prohibiting, except under licence, the manufacture of any product which stated that it was or in any way purported to be a substitute for a given food. But the scope of this Order had obviously been limited, and the Regulations that were made in 1943 went much further in guaranteeing to the public the quality of its food. The Act of 1938 had stated that labels and advertisements must not mislead as to the nature, substance, or quality of the food offered for sale. The Ministry of Food now took opportunity to broaden the scope of this

clause. It added precisely that the public must not be misled as to the *nutritional or dietary value* of the food. The change was a significant one, in that it tacitly assumed that the public both desires to be nutritionally well provided and is prepared to commit to the Government the function of looking after its dietetic welfare.

The matter of the labelling and the advertising of various foods was dealt with by the Defence (Sale of Food) Regulations of 1943 and by the subsequent Labelling of Food Orders made thereunder in 1944 and 1946. Precise provisions were made as to the labelling of foods, and, in particular, claims or suggestions made either in advertisements or on labels that certain vitamins or minerals were present in the food were required to be substantiated by a disclosure of the quantity of the actual vitamins or minerals present. But this requirement as to vitamins or minerals was not, in the Ministry's opinion, sufficient. The public is not always capable of judging the value of the food from an indication of its vitamin content, and there should, in consequence, be no misleading claims as to the health properties of the food. In 1945, therefore, the Ministry took a further step by issuing a suggested code of principles to be observed in the drawing up of labels and advertisements. This code, based on recommendations made by the Medical Research Council, while it is not yet compulsory, has in the main been accepted by the food trades.

Defining the Ingredients

The Orders governing the standards of quality to be reached by a number of manufactured foods go far to meet the suggestion put forward for several years by the Society of Public Analysts, that such standards should be prescribed by a committee established for the purpose. In most instances the regulations have little to do with the nutritional value of the food, but they assist to improve consistently the standards of food manufacture by defining the ingredients that, in the nature of things, will not be immediately apparent to the customer. The commodities so far covered are liquid coffee essences, shredded suet, self-raising flour, baking powder, salad cream and mayonnaise, mustard, jam, and marmalade. It is clear that the Ministry of Food is in an advantageous position to handle this type of regulation. Aware that any measure that followed its recommendations would have to be operated by the Ministry of Health, the Committee of 1934 was concerned that no new standards should be imposed without prior consultation with the manufacturers, and the Committee obviously felt that difficulties might here arise. The Ministry of Health was in no position to deal directly with the multifarious interests that would have to be consulted, and it is doubtful whether any Ministry, until the Ministry of Food finally emerged, could have undertaken this task with any degree of success. The complexity of the problem has inhibited action for the past forty years at least.

The Ministry of Food has now been converted by legislation into a permanent Department of State, and it will indubitably be granted the administration of all powers the Government may see fit to assume for the protection of the consumer of food. It will inherit the 1938 Act with any interpretations it cares to place upon it. Its permanent powers under the Act will include the fixing of standards for the fortification of such foods as margarine and flour, and they may include the issue of regulations on the milling extraction for flour. It is now almost a century since Wakley and Hassall began their classic assault upon adulteration, and the changes that this century has experienced are in some measure a reflection of the growing sense of responsibility of our food industries both to the public and to the Government. Progressively a partnership of mutual respect has been emerging, and this partnership has been cemented by a common appreciation of the social role played by the food chemist. The movement of reform will continue, but there is every reason to believe that the initiative will be shared among the three partners in due proportion until the evils of our civilised diet have themselves been finally exorcised by a surer control over the civilisation that engendered them.

Stages of Reform

The movement has thus shown several well-marked stages. A customer had for long had the presumptive right to get the commodity for which he was paying, and from this point of view it made little difference whether the adulteration or the substitution practised was or was not of a thoroughly objectionable kind. That many of the practices of the early nineteenth century were offensive in the extreme we know from the evidence; but legally this was no more than incidental for the purpose of reform. The question raised after 1875 was whether the standard of ingredients should be prescribed for manufactured foods in such a way as to inform the customer (if he were interested in the matter) what he *ought* to be paying for. That introduced a new principle; for it assumed ignorance on the part of the customer and permitted the State to intervene on his behalf.

The customer, in other words, became a *consumer* in the modern dietetic sense of the term, and by the late 'nineties, the period of the first great social surveys of poverty, there was a feeling

(*Concluded on page* 22)

Agricultural Research

THE report of the director of Rothamsted Experimental Station, Harpenden, Dr. W. G. Ogg, covers the years 1939 to 1945 inclusive as, owing to the war, no annual report has been printed since 1938.

The centenary of Rothamsted was celebrated on July 21, 1943. Nearly 300 guests attended the celebrations, and twenty-five countries, including the Dominions, were officially represented. On September 30, 1943, Sir John Russell retired from the directorship of Rothamsted and Dr. W. G. Ogg, formerly director of the Macaulay Institute for Soil Research, Aberdeen, was invited to succeed him. Sir John joined the Rothamsted staff in 1907 and was appointed director when Sir Daniel Hall left in 1912. During his long tenure of office, Sir John completely reorganised and greatly expanded the station, gathering round him a first-class staff. He built up what is now one of the finest agricultural libraries in the world, and raised large sums of money for the rebuilding of the laboratories, pot-culture houses, and farm buildings, and for the purchase of Rothamsted Farm and Manor House.

Work in War-time

As was to be expected, the war had a marked effect on the work of Rothamsted. The field work of the classical and more important of the other experiments, particularly long-term ones, was continued. Much of the laboratory work had to be allowed to fall into arrears, and many investigations had to be postponed in order that *ad hoc* problems, immediately connected with increased food production, might be undertaken.

In 1940 an Agricultural Research Council Unit, dealing with soil metabolism, was set up at Rothamsted under Dr. J. H. Quastel, F.R.S. This unit was transferred to the University College of South Wales, Cardiff, at the end of 1945.

The Bee Section has been made a separate department recently under Dr. Butler, and a new Pedology Department was established in 1945 under Dr. A. Muir. Arrangements have also been completed for the setting up of a separate Biochemical Department, and for the appointment of a Colonial Soils Adviser.

Soils and Crop Nutrition

Much of the soil work consisted of short-term investigations which could be regarded as "operational research" in the food production campaign, and, as in the past, soil fertility work was a combination of field experiments and laboratory investigations.

Sugar beet manuring trials begun in 1933 were continued, and these experiments, as well as throwing light on the manuring of sugar beet, have proved useful in developing and improving methods of soil analysis for advisory work.

Investigations on organic manures and the study of phosphatic fertilisers, as well as work on trace elements, have also been undertaken.

Other items of research have been concerned with soil moisture and cultivation, nodule bacteria, and other soil micro-organisms and the virus diseases of plants. The study of viruses has been facilitated by the acquisition of an ultra-centrifuge and an electron microscope. New viruses have been isolated and identified as crystalline nucleoproteins.

Entomological Research

Increased attention has been given to field work on fungus diseases, and work in the Entomology Department comprising the study of the causes of insect outbreaks, particular pests—not necessarily insects—such as slugs, wireworms, and gall midges, and investigation on earthworms and their relation to soil formation and fertility.

Despite the fact that there was naturally a concentration of effort on problems connected with the war during the period under review, it was possible to carry on part of the pre-war programme, and the search for new insect test subjects for evaluating insecticides was continued and also studies on the effects of environment on insect resistance. In connexion with this work a prolonged research, in which the various analogues of DDT were compared, showed that, molecule for molecule, DDT was more toxic than its analogues, but that the slopes of the respective regression lines were very different. An explanation of this is being sought.

Apart from the researches of the Bee Department on the physiology, behaviour, and morphology of the healthy bee, investigations on the pollination of food and seed crops, and researches on the diseases of adult bees and their brood, the department made a survey of adult bee diseases.

The application of statistical methods was also part of the work of the station, and one of the most valuable contributions of the Statistical Department has been the preparation of critical quantitative reviews of all the experimental data on certain problems.

Field experiments continue to occupy a prominent place in the Rothamsted programme, and in addition to the large number of experimental plots on the farms at Rothamsted and Woburn, many field experiments have been carried out on private and institutional farms in various parts of the country.

The report includes a list of contributions by Sir John Russell and Dr. W. G. Ogg to scientific literature between 1939 and 1945, together with a list of the publications of the Rothamsted Experimental Station written by members of the staff.

Norwegian Whalemeat Production

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Low Temperature Station for Research in Biochemistry and Biophysics
University of Cambridge and Department of Scientific and Industrial Research

The value of the whale as a producer of edible fat is well known, but public attention is at present rather directed to its potentialities as a source of meat, as well as oil, to alleviate the present shortage of edible protein. Although plans are on foot to bring whalemeat from the Antarctic, at present the only appreciable source of supply is Norway, and the whalemeat which has appeared in the shops was practically all of Norwegian origin.

WHALEMEAT is now eaten everywhere in Norway. It is likely that the habit originated on the old whaling ships, where the fresh meat must have been a welcome relief from salt beef and hard tack, and that, in a country where so large a proportion of the population is concerned with whaling, familiarity with the idea must soon have become widespread. Soon after the 1914-1918 war, when the Norwegian whaling industry flourished, one or two of the whaling stations began to send meat (in some cases packaged) to Oslo, but the quantities involved were quite small. Until recently the chief use for the meat was as food for the silver foxes farmed extensively in Norway for fur; but this was sufficient to develop the production of meat on a considerable scale in the late 1920s, although only a part of it went for human food and the meat was valued mainly because of its low cost.

During the recent war, however, Norway as a German-occupied country was practically without other kinds of meat, and whalemeat from the home grounds came to be a familiar commodity in most households. As a result the industry expanded considerably, and is now so large and well-organised that under peacetime conditions it is capable of providing substantial quantities of meat for export.

Fig. 1.—The harpoon gun is loaded with the line attached, the pointed head being screwed on to the barbs so that different types of head may be used.

Fig. 2.—A small whale catcher, converted from a motor fishing boat, fitted with harpoon guns fore and aft. In the background are several of the larger catchers, each fitted with one large gun, as shown in Fig. 1.

Source of Meat

The meat comes from several different kinds of whale. The fin and "mink" (lesser rorqual) whales are those chiefly caught, although blue and sperm whales are sometimes taken. This is simply because the latter are relatively scarce—so far as the quality of the flesh is concerned there

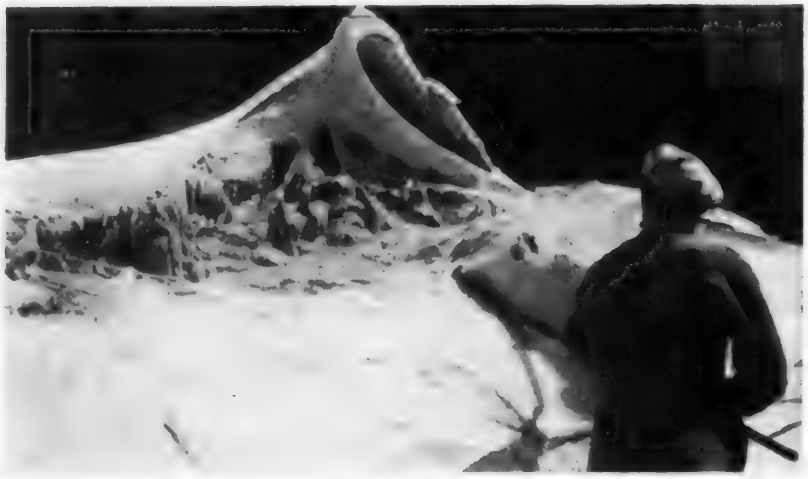


Fig. 3.—The removal of blubber from around the slit in the belly. The muscles are still covered by a thin layer of connective tissue, which is trimmed off when the meat is cut up.

seems to be little to choose between the various species, but that of the bottle-nosed whale is said to be rather too dark in colour.

The meat for human consumption, in Norwegian called *hvalbiff*, is taken only from the four large muscles which lie on either side just above and below the backbone and propel the tail. The rest of the flesh is either too tendonous or too oily for popular taste and is utilised as sausage meat or fox food, for which latter purpose (it may be remarked) it must be no less fresh than for humans.

The whales are hunted on the banks about 100 miles from the Atlantic seaboard of Norway. It is said that they were formerly to be found nearer land, and interesting improvements in technique, described later, have been devised to cope with the increasing distances involved. Catching vessels now operate from all parts of this coast.

The whales are shot with a harpoon gun (Fig. 1) just as in taking them for blubber; but, whereas in that case it does not much matter where the whale is hit, when it is intended for meat it is when possible shot in the neck. If it is shot further back in the body a considerable part of the meat is spoiled, for the explosion tears the meat to pieces, discolours it, and gives it an unpleasant flavour. Despite this danger, an explosive harpoon is often preferred in the hope of killing the whale quickly, for it is believed that in the whale, as in other animals, the meat is of inferior quality if the beast is greatly fatigued before death.

Catching Operations

In describing the procedure after the whale has been shot, it is necessary to distinguish between the small and large operators. The former use small vessels individually—historically the original system. The latter have small fleets of catchers, relatively large and powerful vessels based on well-organised land stations where the whales are handled—this is a development of the last twenty years or so. (See Fig. 2.)

Fig. 4.—The throat of a whale after the blubber has been cut off, showing the deep incision made for bleeding the whale just in front of the flipper on the upper side.

Fig. 5.—One side of a whale being cut for cooling as soon as the blubber is removed. The back fillet (facing the camera) has already been done; sectioning of the under fillet is in progress.

The Small Catchers

The small catchers are now numerous, but this is largely a result of war-time conditions, when there was a large demand for the meat and some of the big stations were unable to operate for military reasons. The small catchers are usually wooden vessels some 50 feet long, often modified fishing-boats which have been fitted with a crow's-nest for searching and one or two small harpoon guns (Fig. 2). They mainly hunt mink whales, which are among the smaller species, generally about 25 feet long. The best hunting-grounds for these are near the Lofoten Islands.

When the whale has been killed it is hauled on to the deck of the boat, a part of the bulwark being detachable to make this possible. On the deck the skin and blubber are removed and the meat cut off in large pieces with the aid of the long-shafted flensing knives with curved blades traditionally used for this sort of operation. Unwanted portions of the carcass are thrown into the sea. Originally the meat was simply spread all over the deck or hung in the rigging to cool. Nowadays the meat is often packed in layers in ice, and under these conditions it may be held for up to fourteen days without serious deterioration—some say that natural ice is better than artificial ice for this purpose. Such congested operations are naturally possible only in good weather.

Alternatively, therefore, the catcher may tow the whale to a convenient sheltered beach on which to cut it up. To make towing safe the whale must be inflated, which is generally done with exhaust gas from the motor, although this introduces the likeli-

Fig. 6.—Removal of pieces of meat into small trucks for carriage to the cooling platform.

Fig. 7.—Pieces of meat spread out to cool on a concrete platform. Each piece weighs about 50 lb., and the quantity shown here represents roughly what is obtained from a single whale.

hood of undesirable oily taint. The beach must not, however, be too far away, for the carcass must be cut up so as to cool as soon as possible or the meat will spoil, since the whale is not a fish but a warm-blooded mammal like the pig or cow.

The meat may be taken by the catchers themselves to packing stations on land, or it may be transferred to a carrier ship. The latter is generally a vessel similar to the catcher, and likewise may or may not use ice. On such small vessels sorting and grading are impossible, so this has to be done at the packing centres. The chief of these are at Trondhjem, Aalesund, and Bergen.

Because of the diverse conditions of working and transport the meat supplied by the small catchers is of variable quality, and it is the custom that the packing station pays to the catcher an over-all price based on the average quality. Some attempt has lately been made to regulate these rather haphazard operations by the formation of an association of small catchers.

The Large Catchers

There are only a few land stations with their own catching fleets. Three are working at present —at Blomvaag off Bergen, at Hestnes west of Trondhjem, and at Steinshamn west of Molde. There was one at Aukra, near Steinshamn, which since the war has not been licensed again to avoid overworking this part of the coast; but a fourth one is now being prepared west of Tromsö, which will extend the hunting of the large whales further north. Each of the three present stations is limited to three catching vessels licensed to operate for six months of the year roughly from May to November, during which time they may take as many whales as they can. They are, however, restricted as to the minimum size of the whales they may take (50 feet), which prevents them catching smaller species like the mink whales or the young of the larger species.

These stations, though few in number, are so effective that between them they supply well over half the total quantity of meat produced, one station catching, perhaps, 200 whales in the course of a season.

They carry out exclusively the practice occasionally adopted by the small catchers of bringing the whales to shore for cutting up. An obvious advantage of this system is that plant can be installed to utilise parts of the whale (such as bones for fertiliser) which are otherwise wasted.

Prevention of Spoilage

The chief difficulty to be faced in such procedure is that a long time may elapse between the death of the whale and the time when it is cut up. The whale is so large, and its body is so well insulated by the outer layer of blubber, that it remains quite warm even after a day in a cold sea, so that the meat may begin to spoil relatively rapidly. To counter this two devices are in use: the belly-wall is slit open to allow sea-water to circulate through the abdominal cavity and round the intestine and the whale is bled. These operations are carried out as soon as the whale has been drawn alongside the catcher by means of the harpoon line, exposing one side.

The belly-wall is slit not along the mid-line but rather to one side between the ventral muscles and the thick under-fillet (Fig. 3), at which point the abdominal wall is comparatively thin. The cut is about 5 feet long and permits the entry of a continuous stream of water during towing. In the most successful operations the intestines float free

and are either cut away or are torn off by the wash during the tow. It is essential that the cut be not carried too far forward, for if the diaphragm is also perforated the whale sinks. The practical benefits of the slitting appear to be prevention of rapid decomposition with gaseous fermentation in the bowels, which causes tainting of the surrounding muscles, and less opportunity of transfer of bacteria to the muscular tissues.

Bleeding the Carcass

Bleeding is effected by severing the main blood vessels in the neck, by means of a deep incision made with a spear-shaped knife, just in front of the exposed flipper (Fig. 4). The blood escapes rapidly and remaining traces are massaged out by the motion of the whale in the sea while it is being towed tail first. Attempts have been made to collect the blood with a large cannula so as to recover it for animal feeding and fertiliser. The effect of this bleeding in delaying putrefaction has not been established; the cooling effect is negligible, but there is likely to be less opportunity for distribution of bacteria throughout the tissues. The advantages of bleeding become evident, however, when the carcass is cut up, as there is little or no release of blood from the vessels, nor does the meat exude any, so that it does not require special draining before packing.

These techniques have so far enabled the land stations to cope with the gradually increasing difficulty of longer towing times as the whales have to be hunted further afield. Now that whales are rarely met less than 100 miles from shore, a catcher which during tow can only make about eight knots can hardly hope to deliver its whale in less than twelve hours after death, and, with longer distances or bad weather, towing times may reach twenty-four hours or more. If a whale is neither bled nor slit the meat may not remain in good condition longer than about twelve hours, which is not long enough under present conditions. Bleeding and slitting extend this period to a minimum of eighteen hours, and under the best conditions, where the intestines are removed and the sea is cold, the flesh may remain sound for twenty-four hours, or sometimes longer, so that these practices are sufficient to enable the greater number of the whales still to be brought in in satisfactory condition.

Inflation of the carcass for towing is particularly necessary when the belly-cavity is slit. Inflation is done in the tongue and in the thoracic cavity so long as the thorax is intact (if it has been perforated by the harpoon the belly cannot be slit); for it is regarded as bad practice to inflate the intestines (for obvious reasons) or the large muscles, since the gas penetrates along the fibres and tears the meat apart. Also, to avoid the possibility of taint by exhaust gases, compressed air is now used.

Butchering Operations

On arrival at the station the whale is hauled up on to a wooden platform and butchering operations begin at once. The chief aim is to get out the large fillets and cut them up to cool as quickly as possible, but the blubber has naturally to be removed first, and it is processed for its oil. Longitudinal slits are made in the skin so that the blubber can be torn off in strips along the whole length of the body. That from the throat and belly is removed first, then that from the back and the hinder part. The strips are pulled off by means of a winch, the flensers assisting by cutting through the layer of tissue between the blubber and the underlying muscle layer (compare Fig. 3). In this way the whole of the upper side of the carcass is stripped in about a quarter of an hour, and they are then ready to begin on the meat.

The tail is cut away and cuts made in the fillet

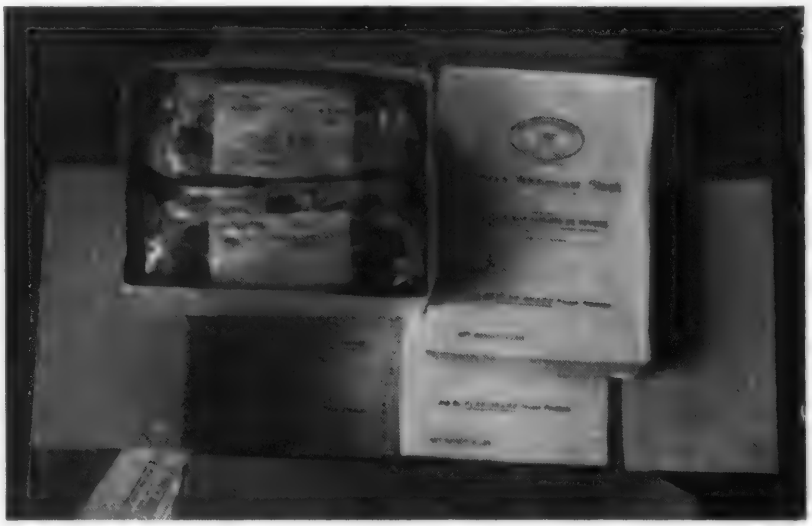


Fig. 8.—An example of a frozen whalemeat pack at present being exported to Britain.

muscles through to the backbone to give sections each weighing 50 lb. to 100 lb. (Fig. 5).

The meat is cut away from the backbone in pieces weighing 25 lb. to 50 lb. and is pulled by steel hooks into specially built metal hand trucks. The front of the trucks can be set underneath the carcass, thereby allowing the meat to be pulled off the carcass directly into the trucks without touching the wooden flensing stage (Fig. 6). The removal of meat begins at the tail and continues along the carcass, care being taken not to touch the intestines until all the best-grade meat has been removed. After the blubber and meat have been removed from one side the carcass is rolled over backwards and the other side dealt with in the same way.

When all the good quality meat has been taken off, the lower part of the backbone below the belly cavity is disarticulated and removed to one side to be sawn up for bonemeal production. The ribs are then cut free and the shoulder with the flipper is disarticulated to permit removal of the contents of the body cavities. Where possible the intestines are slid away as one unit.

The intestines in slit and bled whales are not under any internal gas pressure and are usually floating in sea-water which spills out of the body cavity when the slit in the body wall is enlarged.

The further dismemberment and distribution of the carcass for oil rendering and meat and bonemeal production continues, and finally the stage is hosed down in preparation for the arrival of the next whale.

The trucks of meat are wheeled off the wooden stage to a concrete base alongside and the meat is tipped out there to drain and cool (Fig. 7) before being dragged aside for cutting up, trimming, and grading. The concrete is hosed down at intervals to remove blood.

Grading the Meat

The meat when cool is raised by small electric hoists on to wooden trestle tables where it is graded and cut into 5 lb. to 7 lb. blocks. The meat near the tail flukes contains a high proportion of connective tissue and is considered second grade. The neck muscles and the belly muscles have a high proportion of fat and connective tissue and are also considered second grade. The great bulk of the meat from the back fillets (*longissimus dorsi*) and the under fillets (*psoas*) is first-grade steak meat and requires little trimming except removal of the coarser pieces of connective tissue before being transported in hand carts to the cooling sheds. Here the pieces are spread on wire racks to cool further for several hours. The temperature of the meat is said to fall from about 34° to 35° C. to air temperature of 10° to 15° C. in six hours. Under normal conditions the edible meat from a carcass has been graded, trimmed, and spread on the racks in the cooling shed within three to four hours after the beginning of flensing.

The above account of the operations of a land station may be regarded as representing the best current practice in Norway. It is taken largely from observations made at the Steinshamn station which is generally regarded as the best and which has been the first to develop most of the special methods described. It will be evident that the bleeding, slitting, and cooling correspond (as far as circumstances will allow) with the sticking, evisceration, and chilling of modern slaughterhouse practice with land animals.

Packing and Transport

The subsequent handling of the meat varies with circumstances, and these are changing rapidly at present, for the industry is being reorientated towards an export trade rather than the supply of the home market.

In the past the major part of the meat has been consumed in the more populous southern part of Norway centring on Oslo, and so the supply of meat was directed to railheads at Trondhjem, Aandalsnes, and Bergen. Most of it still goes that way. The journey from the packing station to the railway may take several hours—from Aalesund to Aandalsnes, for example, is at least six hours by sea. The next stage by rail to Oslo takes about a day, ideally in ice-cooled cars. For this traffic it has been sufficient to pack the meat in boxes with ice; control regulations specify a certain type of wooden box lined with parchment paper, and that fresh ice only must be used. This then approximates closely to the conditions under which fish is transported in Britain. Lately, owing partly to transport delays and shortage of suitable freight wagons, it has been found worth while to freeze the meat before it leaves the packing station, especially in hot weather.

This trend is being accentuated by the prospects of export trade to Britain, involving much longer journeys for which freezing is at present essential, and several plants are already in existence in which the meat, cut up into smaller pieces of 1 lb. to 2 lb. in weight, is frozen ready packed (Fig. 8). Some of this material has already reached the British consumer. The majority of these freezing plants are relatively small ones scattered in the northern part of Norway, *e.g.* at Tromsö and Trondhjem, to handle the meat brought in by small catching vessels; but some of the meat from the large stations is also frozen for export—for instance, in the State-owned *Statens Kjøleanlegg* in Aalesund, and at Bergen—and there is little doubt that the next step will be the installation of quick freezing plant at the large land stations themselves.

A further prospect is the air transport of chilled meat, which has been a success with the more expensive kinds of fish, for it is pointed out that in many cases meat could be flown to Britain in a time shorter than that needed to reach even the main distribution centres in Norway with present means of transport.

Hygienic Control

The control of such a widespread and scattered industry clearly presents difficulties, especially as its produce is directed along rather different channels for the home and export markets.

For the home market there have been three recognised grades of whalemeat: (1) best steak meat, (2) meat for sausage making, and (3) fox meat. Briefly, the best steak is meat from the "back" and "under" fillets of younger whales trimmed free of the coarser connective tissues; sausage meat is tougher meat from older whales together with trimmings from the best steak meat; and fox meat is mainly meat from the belly muscles and "shoulder" and neck parts plus meat which is not tender enough or is too fat for the other grades. On the average about 10 tons of total edible meat is got from each carcass. A young whale in good fresh condition will provide 40 per cent. best steak, 10 per cent. sausage meat, and 50 per cent. fox meat; the meat from an old whale will be almost entirely fox meat; and between these two extremes the proportions from a carcass in good condition are 30 per cent. best steak, 20 per cent. sausage meat, and 50 per cent. fox meat.

During the war all this meat was subject to inspection, both as regards nature and hygienic quality, by veterinarians of the Department of Agriculture (*Landbruksdepartementet*), who carry out the control of all kinds of meat at the large distributing centres.

Systems of Inspection

Recently the regulations have been changed, and inspection is now necessary only for the raw first-grade steak meat, such as is exported. The meat inspector is instructed to examine every piece of meat in all boxes, and in doubtful cases to make chemical, microscopical, and bacteriological examinations. The inspection may, however, be made in various places, for examination of goods "in transit" may be deferred to the receiving point.

There are obvious defects in such a system of inspection, which are recognised by the Norwegian authorities. It is often hardly possible for the inspector to examine every piece of meat. Moreover, even if he does, the examination never takes place when the carcass is cut up, but much later, usually in a widely distant distribution centre, so that the veterinarian has nothing to guide him save the appearance, smell, and taste of the meat itself, and if it is frozen these qualities are not easy to decide. It would plainly be better to have an inspector present at all catching and cutting-up operations, but this is impossible in view of the number of the small catchers.

Despite these difficulties, whalemeat has a remarkably clean bill of health in Norway, for the Public Health Authorities have never recorded a case of food poisoning directly attributable to whalemeat, although it has been used so widely.

In addition to this purely hygienic control, a general control of the industry is exercised by a section (*Hvalfangstkontoret*) of the Department of Commerce (*Handelsdepartementet*). This maintains inspection vessels which cruise among the catching fleet and the stations round to ensure that regulations as to size, species, and utilisation of the whales are observed. Attached to this department is an advisory committee which gives guidance in formulating the regulations which govern the conduct of the industry. It also disposes of funds for research (*e.g.* at the *Statens Institutt for Hvalforskning*, Oslo) to acquire the knowledge on which regulations may be based.

Production Figures

The total quantity of first-grade "steak" meat produced last season was computed at about 5,000 tons. It is rather too soon to say yet what this season's yield will be, but it is likely to be substantially less, because the very hot dry summer has led to a scarcity of whales, and the autumn has been mostly too stormy for catching.

The price of this meat as from the packing stations varies roughly from 2.50 to 3.75 Norwegian kroner per kilogram, which is approximately equivalent to from 1s. to 1s. 6d. per lb., the lower price relating to chilled meat packed in large pieces in boxes, and the upper to frozen ready packed produce.

The highly seasonal nature of this production is worth comment. The bulk of it is realised in the three months between mid-May and mid-August, and in a bad year such as the past one little may be forthcoming outside this period. It may be remarked further that a large part of any whalemeat which may be brought from the Antarctic would also probably arrive in May, so that whalemeat is never likely to be plentiful all the year round, unless it can be stored on a large scale in the frozen state.

Cooking Methods

The Norwegians have by experience learned the best ways to prepare whalemeat. It is practically never boiled, partly because this is not customary in Norway and partly because boiling is said to

bring out any fishy flavour. Many of the older recipes involved cooking with vinegar, but this dates from earlier times when the meat was of more uncertain quality and should not be necessary nowadays. The best, and usual, way of cooking is first to grill the meat in thin slices (fat must be added as the meat has been freed of most of its natural fat), and then to serve it as a *ragout* in a thick gravy generally with onion. Prepared in this way good whalemeat is not to be distinguished, except by its rather looser texture and greater tenderness, from ordinary lean beef.

AUTHOR'S NOTE

THIS account was prepared during a visit to Norway on behalf of the United Kingdom Department of Scientific and Industrial Research. The writer would like to acknowledge the kindness and courtesy of every one in that country who assisted him in his duties, and who provided the information given herein.

Modern Nutrition

ONE branch of science in which it is increasingly essential for the critically established facts and theories to be "put over" to the layman is modern nutrition. Few subjects are so open to distortion by pseudo-scientific cranks, and not so long ago nearly every "popular" book about nutrition was of this dubious and dangerous kind. It is a pleasure, therefore, to find that Mr. A. L. Bacharach's book* is again available, now in a third edition. The great Victorian scientists knew how to carry with them the non-scientific public, or at any rate the thinking part of it that mattered. Darwin, Tyndall, and Huxley were never afraid to emerge from their ivory towers and the select pages of Society Transactions. Since then too many of our leading scientists have discovered dignity in being unintelligible except to their colleagues, and this fashion has even been entrenched to the extent that those who do court the interest of the lay world have tended to lose prestige. Fortunately the increasing complexity of specialised subjects has suffocated this anti-social attitude, and today even scientists themselves require semi-popular accounts of what is going on in fields other than their own.

Mr. Bacharach's book is an admirable example of what this kind of writing should be. He has aimed at the intelligent layman and he has tried to carry this abstract reader up with him rather than to bring himself down to that patronisingly low level that congeals so many talks by "experts" on the Home Service. Mr. Bacharach has not presented modern nutrition as a series of believe-it-or-not facts; he has traced the development of our knowledge and taken great pains to show the *how* and the *why*. His theme is not "Isn't science wonderful?", of which we have had far too much in the past ten years. He has chosen the quieter theme "Isn't science logical?", and as a result his book is far more readable and durable than any romantic presentation overloaded with exclamation signs and personality paragraphs.

Scientists who are not specialists in nutritional biochemistry will value the author's refusal to "write down" his subject. In the food and agricultural industries the book must continue to be widely read. The long section on vitamins is probably the best general treatment that this rather dynamic subject has yet received, and it will sort out the wood and the trees in more circles than those of the layman.

It is a pity that the policy of numbered paragraphs has been followed. It gives the book a textbook appearance and encourages the dose-reading habits of painful education—no author who can make serious reading enjoyable and painless needs these devices. However, this is an ungrateful complaint. By one reader to whom an earlier edition has been of constant value, those who have not so far come across this book are urged to acquire while they can a third-edition copy to enjoy immediately and to keep on their reference shelves.—D. P. H.

* *Science and Nutrition.* By A. L. Bacharach, M.A. (Cantab.), F.R.I.C. 3rd Edition. Pp. 142+xii. London. Price 6s.

Social History of the Pure Food Laws

(*Concluded from page* 13)

abroad that the dietetic welfare of the consumer, especially the poor consumer, should be protected. Much of the food that reached him was processed or manufactured, and it could be argued that he was in no position to judge for himself the nature of the ingredients used. The new principle, however, took some time to establish, partly because there was apprehension lest standards should be too rigidly applied, but greatly because intervention by the State was still an unwelcome idea to many. By the early 'thirties the concept of standards was already becoming familiar in marketing practices, and, what was even more significant, the danger of vitamin and mineral deficiencies in the diet was making it very desirable that our processing methods should be carefully scrutinised and that some attention should be paid to the claims made on labels or in advertisements. The war merely gave the occasion for gathering these trends and accelerating the pace of reform.

Vitamin A Synthesised

The final gap in the range of major synthetic vitamins has been filled by Dutch and American chemists working independently.

VITAMIN A was the first vitamin to yield up the secrets of its chemical structure. The work was done by Karrer and his co-workers in 1931, and it opened the way to the elucidation of the structures of all the other major vitamins and to their subsequent synthesis. But although the structure of vitamin A has been known for so long, it has hitherto defied all attempts at synthesis. True enough, in 1937 Kuhn and Morris stated that they had prepared a concentrate reputed to contain 7 per cent. vitamin A, but this was never confirmed, and the two workers have not since published any reports of further work. Recently, however, this most intractable substance has been synthesised. Credit for the achievement seems to be shared by two firms—N/V Organon of Oss, Holland, and Distillation Products Inc. of Rochester, New York, both of whom have been working on the problem independently for some years. While it is not yet possible to compare the methods used by the two firms since the U.S. company has not yet disclosed its techniques, a study of the data released by N/V Organon gives some idea of the complexity of the problem now finally solved. Further interest lies in the rapidity with which both firms can translate laboratory methods into commercial techniques. Distillation Products, for instance, hope to be in large-scale production within a year.

To assess the achievement properly it is necessary to recall the difficulties upon which previous attempts at synthesis have foundered. The nucleus of the complex molecule of vitamin A is deceptively easy to obtain. Its side-chain, however, is extremely fragile, and when attempts were made to build up the molecule it was found that the finished part collapsed whenever a new piece was added. When Organon's two chemists, A. J. Arens and D. A. van Dorp, tackled the problem in 1943 they used what is believed to be an entirely new technique. They built up small sectors of the molecule piecemeal and then joined them as though assembling a jigsaw puzzle. By 1944 this technique had yielded something differing only slightly from vitamin A, a substance which they called vitamin A acid.

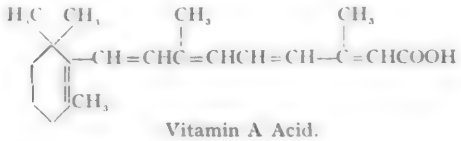
Dr. A. J. Arens and Dr. D. A. van Dorp, the two Dutch chemists who announced their final synthesis of vitamin A in June, 1947.

Preparation of Vitamin A Acid

When this work was reported in *Nature* early in 1946 (**157**, No. 3981, p. 190) little attention seems to have been paid it. It is of interest, therefore, to recall the relevant parts of the paper, since similar techniques to those described eventually led to the synthesis of vitamin A. This is how the workers described their process:

"The preparation of ionylidene-crotonic ester has been described by K. Ziegler in a German patent application. Ziegler assumed that the reaction between β-ionine, γ-bromocrotonic ester and zinc in benzene produced an ester from which, by saponification, a yellow, oily acid was obtained. However, we found that the main product of the reaction is the *hydroxy*-ester. By dehydration with anhydrous oxalic acid this ester is partly converted into a substance from which, upon saponification, we isolated three crystalline acids. The main acid is the ionylidene-crotonic acid, which consists of brittle yellow prisms (m.p. 115·5° C. to 157° C.) . . . the two other crystalline acids are colourless. By means of lithium methyl, this first acid is smoothly converted into a 'C_{18} ketone,' a thick yellow oil (b.p. 138° C. to 140° C. at 0·01 mm. pressure). The semi-carbazone (m.p. 188·6° C. to 189° C.) exhibits a single, well-defined absorption maximum at 3,470 A (log $E = 4{\cdot}69$). With antimony trichloride in chloroform, and also with concentrated sulphuric acid, it produces a deep, wine-red colour. It is highly probable that it has a structure very similar to vitamin A, because by means of a Reformatski reaction with bromoacetic ester and zinc in benzene it can be converted into a mixture of esters which has a distinct vitamin A activity. After dehydration of this mixture with

anhydrous oxalic acid, followed by saponification, we isolated a yellow crystalline acid (m.p. 162° C. to 168° C.):



Vitamin A Acid.

"The activity of this acid is only half of vitamin A given orally: hence it is as active as β-carotene given in oil by mouth."

The Final Synthesis

Although it was not possible to prepare synthetic vitamin A from this acid, the fundamental work involved in its production proved to be the key to the final synthesis. Going back to the same "C_{18} ketone" which had yielded vitamin A acid, Arens and van Dorp were able, in May of this year, to prepare from it vitamin A aldehyde. Vitamin chemists had already demonstrated the feasibility of reducing this aldehyde when obtained from natural vitamin A, and its synthesis brought the final stage of the work very near. In fact, the first synthetic vitamin A was produced only a month later. The technique used involved the reduction of the aldehyde by means of aluminium-isopropoxide and isopropyl alcohol. After chromatography an oil fraction was obtained containing about 35 per cent. vitamin A according to its absorption spectrum and biological activity. Physical and chemical tests proved this product to be identical in all respects with natural vitamin A.

The American Synthesis

Distillation Products Inc., which is a subsidiary of the Eastman Kodak Co., announced their synthesis of vitamin A in a paper read by one of their research team, Dr. J. G. Baxter, at the 112th meeting of the American Chemical Society in September. Other members of the six-man team which has been working on the problem for some years are J. D. Cawley, C. D. Robeson, L. Weisler, E. M. Shantz, and N. D. Embree.

Several grams of pure crystalline synthetic vitamin A were exhibited at the meeting and for the purposes of comparison a sample of high potency concentrate of the acetate ester of the synthetic product and a sample of pure acetate crystals from the natural product were also displayed. The crystalline synthetic vitamin is claimed to have a biological potency of 3,300,000 U.S.P. units per gram, which is the same as that of the natural crystalline vitamin A prepared by the firm about seven years ago.

Little information on the method of synthesis or on the materials used was given, much of the paper being concerned in proving that vitamin A, and not merely some substance with vitamin A activity, had been synthesised. In tests it was found that the synthetic concentrates absorbed the same ultra-violet wave length as natural vitamin A and gave a characteristic blue colour with antimony trichloride.

Early manufacture of the commercial product, which will be called *Myvax* and which will have a biological activity of about 1,000,000 U.S.P. units per gram, depends almost entirely on the rapidity with which proper equipment is obtained. In this connexion the firm has the advantage of being producers not only of vitamins, but also of high-vacuum equipment.

Huge Demand for Vitamin A

Although the satisfaction of each group of workers in their achievement must, perforce, be tempered by the thought that the credit must be shared, the great need for vitamin A all over the world provides an almost inexhaustible demand for the synthetic commercial product if it can be sold at competitive prices.

The huge demand for vitamin A concentrates, of which, it is estimated, only about one-third can be met from natural sources—mainly the liver of cod, halibut, and soup fin shark—has been caused by widespread shortages of those foods, such as milk, butter, eggs, and liver in which the vitamin occurs naturally. This has led many countries, including Britain, to fortify margarine with vitamin A. When vitamin A concentrates are added to a food in this way it is naturally important that they should be tasteless. Preparation of concentrates measuring up to this requirement from fish-liver oils is not easy. With a synthetic vitamin A it is likely that this difficulty will be overcome. Another important characteristic of the synthetic product is that, unlike its natural counterpart, it is water-soluble, thus making possible administration by injection.

FOOD MANUFACTURE INDEX

THE 1947 Index of FOOD MANUFACTURE is now available. Will subscribers in the U.K. requiring the Index send a stamped addressed envelope, measuring 10 in. by 8 in., if they wish to receive it flat. In the case of subscribers abroad, the envelope need not be stamped. In all cases applications should be addressed to the Subscription Department, FOOD MANUFACTURE, 17, Stratford Place, London, W.1. *Early application is advised.*

New Plans for Agricultural Marketing

Most important of its kind since the Linlithgow Committee Report of twenty-five years ago, the report* of the Lucas Committee to study the working of the Agricultural Marketing Acts has now been published. A brief survey of its recommendations is given here.

UNDER the chairmanship of Lord Lucas, the Committee, consisting of Mr. E. A. Bell, M.A., B.Sc., Sir Basil Mayhew, K.B.E., R. T. Paget, M.P., and John Ryan, M.C., M.A., B.Sc., was set up on December 19, 1946, to review the working of the Agricultural Marketing Acts, to consider modifications to those Acts, and to make recommendations covering the whole field of marketing to the consumer.

Included in the comprehensive survey of marketing reforms during the period between the two world wars are details of the passing of the Marketing Acts, and the history of the various schemes and agricultural commissions set up during that period, followed by a study of the war-time arrangements and methods of control.

Recommendations for Reorganisation

Conceiving their main task to be the making of recommendations in connexion with the organisational structure of agricultural marketing best adapted to the needs of the country's future economy, the Committee considered that the whole system of wholesale and retail distribution should undergo investigation. That no plan for the orderly marketing of home produce would stand the strain of unregulated and unco-ordinated imports was strongly emphasised, especially in connexion with horticultural products. On the basis of pre-war experience, and taking into account the new factors which have since come into the situation, it was apparent to the Committee that the problem to be considered involved not only the amendment of the Agricultural Marketing Acts in certain directions but a reconsideration of the whole question of the type of marketing machinery best adapted to modern conditions.

Four possible alternatives were put forward:

1. A return to the free market as it existed before 1931, that is to say, the policy of *laissez-faire*.
2. The policy of reverting to the pre-war system of Agricultural Marketing Acts under which producers were in a position, subject to certain safeguards, to exert monopoly control over the marketing and distribution of agricultural produce.
3. The retention of the existing comprehensive system of control by the Ministry of Food extending from the farm gate to the consumer.
4. The marketing of farm produce managed on public utility lines by corporations representing not any sectional interest but the community in general.

The first three proposals outlined above were rejected by the Committee, and in respect of the second the Committee was impressed by the fact that not in all cases have producers been aware of the importance of choosing men of suitable quality to be their representatives on boards, and stressed that it would be utterly wrong to allow a single sectional interest or combination of sectional interests to exercise monopoly rights in the disposal of public property.

While recognising the achievements of the Ministry of Food in maintaining the distributive system of this country, and realising that this third alternative line of policy had the support of a section of the distributive trades, the Committee did not consider the Ministry to be a suitable instrument for disposing of the agricultural produce of this country upon a permanent basis; in fact, it was their firm opinion that neither the Ministry of Agriculture nor the Ministry of Food should have an exclusive voice in the control of agricultural marketing.

Role of the M.o.F.

In support of this, the Committee said that the Ministry of Food was a distributors' Ministry recruited largely from men drawn from the distributive trades and, inevitably, had become distributor-minded. The process of disposing of the products of this country was one in which producer, distributor, and consumer alike were interested, and control of this process should not be entrusted to a body which was predisposed to any one of those interests. That efficient agricultural marketing would entail a fairly ruthless cutting of many distributive margins and the elimination as redundant of many distributive and processing interests was the belief of the Committee, who thought a Government Department a poor instrument for this purpose.

* *Report of the Committee appointed to review the working of the Agricultural Marketing Acts.* Economic Series No. 48. Pp. 96+iv. Price 2s. net.

Commodity Commissions

In strong recommendation of the fourth alternative, the Committee outlined the duties of an independent body, which they referred to as a Commodity Commission, and which should be financed from public funds. Commodity Commissions should ensure that the arrangements for the marketing of the produce in respect of which the State had guaranteed the producer both an outlet and a price should be as efficient and economical as possible, there being one Commission for each commodity or related group of commodities. Control would be acquired over the produce, normally by purchase, at the point to which the producer's guaranteed price related, and a general control would be retained—but not necessarily physical ownership—of the produce through all the subsequent stages of handling and processing.

It was the opinion of the Committee that the size of the Commissions should be as small as possible, since small executive bodies generally work more efficiently than large ones, though in the case of some commodities—for example, livestock and meat—a main Commission with a number of subcommissions for the different classes of meat might be necessary. It was further recommended that the members of the Commissions should be jointly appointed by the Agricultural Ministers and the Minister of Food. Opposition to any form of nomination of members of the Commodity Commissions was emphasised, such members to be, in fact, the business executives of the tax-payer and as such they could not be responsible, as delegates, to anybody else. Separate advisory committees nominated by producers, processors, wholesalers, retailers, and any other sectional interest concerned were recommended for the purpose of consultation with the Commission on matters of common concern, and in the case of livestock and meat the appointment of an advisory committee of qualified veterinary practitioners was urged.

Ownership of the produce should be assumed by the Commodity Commissions at the point of the price guarantee, and they should be placed in a position to exercise full proprietary rights in the product from this stage. Supervisory powers would be needed to enable them to maintain control over the produce, where necessary, after they had parted with physical ownership.

Agricultural Policy

As regards the agricultural policy, the Government would undoubtedly look to the Commissions to provide informed and unbiased advice on the conditions of supply and demand in connexion with the annual or special reviews of prices undertaken in accordance with the Agriculture Act. At the same time the Commission should, in most cases, provide the most efficient machinery for implementing both the price and market guarantees to producers, and it was strongly recommended that Commodity Commissions should be brought into the annual price negotiation procedure at an appropriate point.

Delivery of produce would be taken by the Commodity Commissions in accordance with the contracts made with producers either direct or through their boards, and disposal of the whole supply would be arranged in the most efficient and economical manner possible. To this end they would be equipped with trading powers, but the Committee thought that the Commissions would normally make full use of the existing channels of processing, manufacture, and distribution and sell or direct their produce to private merchants and manufacturers, such trading powers only to be used in so far as those agencies failed to provide the most efficient and economical service and to provide the Commissions with a yardstick whereby they could measure the efficiency of those services. The Committee emphasised, however, that no tenderness for existing interests must be allowed to stand in the way of the tax-payer's right to have his produce disposed of by the most efficient organisation possible.

Gradual Reform of Marketing Systems

Comprehensive reorganisation and reform of the marketing systems would have to be a gradual process and the steps to be taken would differ from commodity to commodity. One of the main weaknesses before the war in the marketing of agricultural produce was the lack of proper provision for various forms of storage, and it might be that regulation of movements into and out of store would be a potent means of levelling out seasonal and other short-term price fluctuations for such commodities as potatoes, eggs, and even meat. The efficient organisation of transport and the movement of produce from collecting centres or grading and packing stations would also require careful consideration.

Dealing with the question of the establishment of grading and packing centres, the Committee gave a warning that, valuable as grading and standardisation undoubtedly were for the establishment of consumers' confidence in the produce offered to them, they must not be allowed to become an obstacle to the lowering of the prices charged to consumers.

The subject of producers' marketing boards is fully dealt with in the report, the Committee being convinced that the disciplined co-operation of producers in this field was vitally necessary for the

success of the new agricultural policy. For guaranteed price commodities, one of the chief functions envisaged for producer-controlled marketing boards would be to undertake the negotiation of the contracts with the respective Commodity Commissions. The negotiations would also provide scope for collective bargaining, particularly as regards the payment to be made for any marketing services collectively rendered by producers but not taken into account in fixing the global sum payable under the price guarantee.

Producer Marketing Boards

It would be the duty of the marketing board, having negotiated the contract on behalf of producers, to ensure that its terms were adhered to by the producers to the fullest possible extent, and for this purpose it was the opinion of the Committee that the statutory powers of the Agricultural Marketing Acts should continue to be available for use by producer marketing boards. It was clear that there was no case for the use of boards of such powers after the point at which the producer's price (including any remuneration for marketing services exclusively performed by producers on behalf of the Commission) had been guaranteed. Should producers wish to carry on marketing activities after this point, such as the operation of creameries or bacon factories, for example, they should be free to do so but should purchase their supplies of produce from the Commission on the same terms as any other trading interest.

There could be no doubt that, under a system in which the Government assumed the commercial risks involved in the product and also responsibility for its efficient and economical processing and distribution, producer boards would be likely to find the greatest scope for constructive activity in the promotion of measures designed to raise productive efficiency, and the Committee were of the opinion that no other agency was, in fact, so well fitted for the performance of this task, which is fundamental to marketing efficiency.

Fat Stock

Taking fat stock as an example to indicate the application of their recommendations for a guaranteed price commodity, the Committee suggested that a producer marketing board should be formed which should be responsible for those functions that can be best performed by producers on a co-operative basis. These should include:

(*a*) Co-operative buying of feedingstuffs.

(*b*) Provision of beef bulls for artificial insemination, preferably in collaboration with the Milk Marketing Board and other proprietors of existing Artificial Insemination Stations.

(*c*) Settling all contracts for transport and insurance to collecting centres.

(*d*) Negotiating with the Commodity Commission the contract pursuant to which the guaranteed price should be paid. This contract should include both a system of payment in accordance with grade based upon the estimated killing-out weights, and a system of premiums for animals yielding meat of a quality most desired by the consumer. The combined effect of grade and premium should be so adjusted that the ultimate price realisable for the meat as a result of consumer preference was reflected back to the producer.

Grading should take place at the collecting centres, which might be operated either by the Commission or by the marketing board, the general conclusion of the Committee being that it would be more convenient for marketing boards to operate the centres, since they would be responsible for transport from the farm, and transport should dovetail into the operation of the centre.

Suggestions for the Meat Commission

The prices for livestock would be paid to the farmers at the collecting centres, and the animals would then become the property of the Commission. The Committee set out the following proposals for the formation of this particular Commission:

(*a*) Complete reorganisation of the existing slaughterhouse arrangements, directed towards the establishment of a series of modern factory abattoirs of suitable size and location, in which the functions of slaughtering and processing have been fully integrated. The minimum throughput for these factory abattoirs would probably be in the neighbourhood of 3,000 head a week. The Commission might itself establish some factory abattoirs in addition to licensing producers' organisations, municipalities, consumers' co-operative societies, and private enterprise to establish others.

(*b*) The efficient and full utilisation of all by-products of slaughtering and the elimination of unnecessary profit margins at all stages of marketing of meat.

(*c*) The establishment of reliable quality grades for home-produced meat backed by an advertising campaign designed to encourage consumers to buy home-produced meat on the basis of the established grades.

(*d*) The diversion of poor quality meat to manufacturing, so that the reputation of home-grown fresh meat should not be injured by an inferior product.

(*e*) An investigation of the wholesale meat trade and consideration of its rationalisation.

(*f*) The trial of new methods of selling meat, such as the sale and delivery of pre-packed joints direct from the factory abattoirs to retail shops.

Non-guaranteed Price Commodities

As regards non-guaranteed price commodities the general view of the Committee was that the provisions of the Agricultural Marketing Acts, amended in accordance with their recommendations, should be available to producers, but that

before giving approval to proposed schemes the Ministers concerned should carefully consider whether any of the powers proposed to be taken by a producer-controlled board should not preferably be vested in an independent Commission.

The Committee felt that special considerations in the cases of hops, fruit, and vegetables existed, and these were dealt with separately in the report.

Fruit and Vegetables

Producers of fruit and vegetables (other than potatoes) comprised by far the largest section of the agricultural industry to which the price and market guarantees of the Agriculture Act had not been extended. Horticultural marketing, according to the Committee, illustrated in exaggerated form every weakness that could be found anywhere in agricultural marketing, and tentative suggestions of the possible field of operation were outlined by which boards might work upon an area basis and should be small enough to enable the board members and officials to have close and personal contact with the producers. The Commission, with its experience of consumer demands, would be able to advise the local boards of its expected requirements, and it would be upon the basis of these requirements that the production would be planned. The maintenance of a central market nerve-centre by the Commission was suggested, so that as crops came forward producers would either directly or through their boards inform the centre by telephone and would thereupon receive direction as to where the goods were to be sent. The practices of merchants, commission agents, wholesale distributors, and retailers would be further regulated by the Commission, who would also deal with such matters as the resiting of the main central markets. This would promote conservation and processing and would keep a close watch on imports in the interests of general market stability.

Horticultural Commodity Commission

In view of the fact that for these products producers must continue to bear the full commercial risks, the Committee did not consider that, pending the establishment of an independent Commission, the full powers of the Acts—even those giving marketing boards monopoly control over supplies marketed and the channels, terms, and conditions of sale—should be denied to producers of horticultural products, but it was their strong opinion that the reorganisation of horticultural marketing upon a satisfactory basis could not be done by producer marketing boards alone. Something might be achieved in the production of a higher class of product and in improved grading, but it was doubtful whether the industry had the ability to shoulder the financial responsibility for the establishment of modern packing stations, markets, and conservation plants, which the Committee considered to be necessary. It was therefore recommended that the Horticultural Commodity Commission should have made available to it public funds adequate for such purposes.

That legislative provision would have to be made for the establishment of the Commodity Commissions as recommended by the Committee was fully realised, as was the necessity, *inter alia*, of introducing a number of amendments to the Agricultural Marketing Acts as they stand at present. It was also the opinion of the Committee that the procedure under the Acts could with advantage be amended in certain other respects. With these considerations in mind the Committee submitted further recommendations.

Constitution of Boards

Dealing with the consitution of boards administering the schemes, the Committee felt that there should be revision to provide that the board appointed to administer a scheme under the Acts should be composed of not more than sixteen members, of whom not less than one-fourth should be persons of commercial, financial, or administrative ability appointed by the Minister, the remainder to be representatives of the registered producers, elected by the latter in such manner as may be provided by the scheme.

Penalties Tribunals

It was further recommended that the 1931 Act should be amended to provide that Penalties Tribunals should be composed of special committees of the board, to be presided over by an independent person who should be a barrister of not less than five years' standing. In the case of guaranteed price commodities the power of quantitative control of production or of sales should be exercised by the producer boards concerned only for the purpose of giving effect to Ministerial Orders. Where any scheme or schemes submitted under the Acts related to a commodity for which a guaranteed price was at the time in force, the scheme or schemes should be approved by the Ministers only if the whole of Great Britain were covered by the scheme or schemes.

A list of organisations and individuals submitting evidence, explanatory notes on the main provisions of the Acts, and various statistical tables are included in three appendices to the report.

Present Day Nutrition in Britain

How much food does the nation need to maintain the health and vigour of its population? How much of what is needed can be provided by our own farmers and fishermen? Would it be possible by untiring efforts and the more widespread application of scientific methods to make any further increase in the production of foods above the high level already attained during the war? Specialists in dietetics and experts in agriculture and fishing attempted to answer these questions at a recent meeting of the Nutrition Society, which was held in London with the Right Hon. Dr. Walter Elliot, P.C., M.P., as chairman.

THE difficulties which must be faced when an attempt is made to budget for national food requirements have been clearly expressed by Dr. E. C. Wood, who has suggested that three distinct lines of approach to the problem are possible. Thus calculations may be based on (1) the minimum amounts of foods which are necessary to maintain health, (2) the amounts required to comply with some standardised food pattern, or (3) the amounts which would be consumed if the whole population could eat its fill of its favourite foods, without being deterred by considerations of expense.

A little thought, however, will show that great variations are still possible in the interpretation and application of each of these alternatives. If our diet is to be judged by the maintenance of health, what are the standards at which we must aim? Are we to be content with food which keeps us alive and allows the ordinary activities of life? Even if we get rather thin and hungry does it matter provided we can still work reasonably well? Or are we to consider that our health is only truly maintained when our appetites and tastes are fully satisfied, and we are continually seeking to avoid an enlarged waistline by hard work and health-giving exercise? If we are to be satisfied with some level between these two extremes, then where is the line to be drawn?

The choice of a representative dietary pattern is no easier. Must our meals be modelled from the rich man's or the poor man's table? How many meals per day do most of us eat, and do we prefer supper or high tea? Must we aspire to eggs and bacon for breakfast, or should we emulate our continental neighbours in being content with toast and coffee? Above all is there any particular virtue in our dietary pattern, or is it just a matter of habit? Could we feed ourselves equally well by some completely different pattern involving simpler and less costly foods?

Dr. Wood's third alternative may seem in some ways no more than a dream, since we cannot seriously hope to live in a land where the proverbial milk and honey are free for all. It raises a real problem, however, in regard to sugar. This commodity is cheaply produced, and if freely available would undoubtedly be consumed in amounts much greater than the present rations allow. How then are we to decide between the popular demand and the medical opinion that excessive amounts may be undesirable?

The Right Hon. Dr. Walter Elliot, P.C., M.P.
Courtesy Elliott and Fry, Ltd.

A Commonsense Compromise

Dr. H. E. Magee, and his colleagues of the Ministry of Health, have based their calculations of our national food requirements mainly on a careful study of our typical food pattern. Their first step was to frame diets for representative individuals in the various groups of our population, arranged according to age, sex, and condition. These diets were planned so as to conform to British habits of eating, when unhindered by rationing, and at the same time so as to provide sufficient nutrients for the maintenance of health. Thus, to satisfy scientific requirements, calories, proteins, minerals, and vitamins were all included in amounts fulfilling the exacting standards laid down by the Technical Committee of the League of Nations. To satisfy standards of taste and to stimulate the appetite meat, fish, bacon, eggs, and cheese were recommended in amounts sufficient to provide a savoury dish in each of the three main daily meals through-

out the week. Milk and fruit were also allowed in liberal amounts, particularly in the diets proposed for children and for expectant and lactating mothers.

The next step was to consult statistics on proportions of the various groups in our population, and from the data so obtained to total up the national requirements for each foodstuff in tons per year. The figures so obtained indicated that in the immediate future we should need 48 per cent. more milk and milk products than before the war, together with 56 per cent. more potatoes and 27 per cent. more vegetables. On the other hand we should be satisfied with 14 per cent. less sugar than before the war, 5 per cent. less meat, and 6 per cent. less grain. By 1964 all our demands will presumably have increased considerably, with the demand for meat 50 per cent. and for potatoes 60 per cent. above the pre-war levels.

Food and Work

The excellent and palatable diet which Dr. Magee has visualised may seem to the less optimistic to be beyond realisation, at least in the immediate future. Some may consider, with Mr. le Gros Clark, that the liberal allowance of meat, as compared with our present level, would be a pleasant luxury rather than a necessity. The proposed meat consumption, however, would still fall far short of that enjoyed in America and Australia. There is also much to be said for the view that unattractive, tasteless meals cannot promote the sound nutrition necessary to sustain prolonged hard work, even if adequate calories and all other nutrients are provided. As Dr. Magnus Pyke, of the Ministry of Food, has pointed out, meat has a value other than as a source of protein in increasing appetite and facilitating the consumption of other foodstuffs.

The carefully controlled investigations carried out by Professor J. Beattie in German prisons have afforded an excellent illustration of the absolute necessity of adequate feeding if a satisfactory performance in manual work is to be expected. His subjects, all of whom were selected volunteers, were not allowed to do any form of work, and were restricted to a diet which provided only 1,750 Calories daily. As the first result of this treatment they all lost weight, but after a time no further fall was observed. Measurements of their basal metabolic rates, or roughly speaking of the amounts of heat which their bodies produced when in a state of complete rest, were then carried out. In all cases the values found were much lower than in subjects receiving normal amounts of food.

At this stage each volunteer was given additional food, equivalent to an extra 500 Calories, in the expectation that the extra energy could be devoted to the performance of forestry work. It was found, however, that the undernourished body revolted against the use of the extra food in this way, and responded with an immediate increase in the basal metabolic rate. Food, therefore, is only used efficiently for the performance of work after the normal requirements of the body have been satisfied. Under these circumstances the "safety margin" allowed by Dr. Magee's proposed diet may seem to be amply justified.

Present Agricultural Policy

Since the density of the population precludes the production of our whole food supplies in this country, our agricultural policy has always to lie between two extremes. On the one hand we may concentrate, as advised by Sir John Orr before the war, on the production of "protective" foods of animal origin, including milk and its products, meat, bacon, and eggs. This policy presupposes that the bulk of our calorie requirements, and particularly cereals and sugar, may be purchased from abroad, and imported without interference. With this proviso it seems to give the greatest hope of raising our standards of nutrition to the optimal level for the maintenance of health. On the other hand we may be forced, either by enemy action during war or by economic pressure afterwards, to produce as great a proportion of our calorie requirements as possible, even at the expense of going short of the highly desirable protective foods.

The general tendency of our policy during and since the second world war has been to increase the production of cereals, potatoes, and vegetables at the expense of a lowered production of meat, bacon, and eggs. Milk production has actually been increased on the dual grounds that it is the food *par excellence* for infants and growing children, and is at the same time the most economically produced of all animal foods per unit of fodder consumed. It is obvious, however, that each farm animal has its own particular place in food production, and all must have a limited use in any agricultural programme. Pigs can subsist on refuse, swill, unsaleable potatoes, and other scraps. Sheep can flourish on bleak mountains which would feed no other animal. Hens can be handled by the farmer's wife or the backyard poultry keeper. Our agricultural policy must therefore not only take into account the most appropriate balance between home produced and imported foods, but must ensure that all aspects of our home agricultural policy are in harmony with the general purpose, and that each form of husbandry is conducted as efficiently as possible.

Home-Produced Crops

The possibilities of improving our production of the main calorie foods, cereals, and root crops, have been studied by Dr. E. T. Jones, of the Welsh

Plant Breeding Station. He calculates that on the basis of Dr. Magee's proposals we now produce 35 per cent. of the wheat, 34 per cent. of the sugar, and 125 per cent. of the potatoes which are necessary for our adequate nutrition, and that these items now supply about 46 per cent. of our total calorie needs. Considerable changes and improvements would be necessary in order to improve significantly on these figures. More intensive cultivation of potatoes, however, might allow us still to have a margin of safety with a smaller acreage under cultivation, which would enable more land to be used for growing cereals and sugar beet. Recent trials have shown that with improved strains of wheat and improved methods of cultivation the yield per acre has been steadily rising. Thus during 1939-1944 each acre produced 19·05 cwt., as compared with 18·04 cwt. in 1934-1938. Yields of 22 cwt. per acre should be possible, and with a greater area of land devoted to this crop should at least make us a little less dependent on supplies of food from external sources.

The difficulties of more intensive crop production, however, must not be minimised. Dr. W. K. Slater has pointed out that any further land brought into cultivation would necessarily be of inferior quality. Unduly intensive cultivation would moreover lead to competition for materials and labour. Thus any substantial increase in the sugar beet crop would necessitate a large number of new recruits in the agricultural industry, and also the erection of many new factories, with the diversion of building workers from the urgent housing problem. It is perhaps worth noting that Dr. Jones's proposal to cut down the acreage allocated to potatoes was made before we heard the unwelcome news of the rationing of this essential foodstuff.

Milk Production

Dr. H. D. Kay, F.R.S., has reported that our present milk supply is equivalent to 0·62 pint per head of the whole population per day, and he calculates that 0·77 pint would be necessary to reach the target demanded by Dr. Magee. The Ministry of Agriculture planned to exceed pre-war production by 7 per cent. in 1946-1947, and they hope that by 1951-1952 production will have increased by 23 per cent. Even this substantial improvement, however, would fall short of the 31 per cent. increase required by Magee.

In increasing milk production the main problem will be to secure more food for cows. Little could be done either by increasing the acreage available for grazing, or by increasing the bovine population. What is needed is not more cows giving small yields of milk, but large yields of milk from the present number of cows. Artificial insemination by bulls from proved milking strains is proving most valuable in breeding cows of high milking capacity, but animals of this type require extra food and extra attention. In the home production of fodder considerable progress is already being made. Thus the summer flush of grass is preserved for winter use in the form of silage or high-quality hay, while ley pastures are being sown with improved strains of grass. The importance of concentrates such as grain, bean meal, and oil cake, however, cannot be over-emphasised. To achieve the increases in milk production already visualised by the Ministry of Food, it will be necessary to import 390,000 tons of concentrates annually, whereas Dr. Magee's proposals would require 590,000 tons. High hopes are entertained that the East African groundnut scheme will provide large amounts of pressed cake for feeding dairy cows.

Home-produced Meat

An agricultural policy based on the maximum production of cereals, root vegetables, and milk must obviously imply a low production of meat. Dr. John Hammond, F.R.S., has quoted statistics which fully confirm this deduction. Thus in 1932 our annual production of meat per head of the population totalled 65 lb. of carcass weight, and included 30 lb. of bovines, 15 lb. of sheep, and 20 lb. of pig. For 1946 the total production was only 38 lb., and included 24 lb. of bovines, 8 lb. of sheep, and 6 lb. of pig. Our sheep population was reduced from 26 millions to 18 as the result of war-time agricultural policy, and a further 4 million were lost in the blizzard early in 1947.

If we are to augment the contribution made by home-produced meat to our estimated annual requirement of 146 lb. per head, the main essential once again is to increase supplies of imported fodder. Small gains, however, could undoubtedly be made by the more efficient and intelligent use of home-grown foodstuffs. Thus it would be a good plan to time the fattening of bullocks so as to take advantage of the summer flush of grass, and then keep the meat in cold storage until required. In breeding sheep to restore our depleted flocks the Border Leicester, and other types with a high incidence of twin lambs, should be encouraged. A few pigs should be kept on every farm to use up odd scraps of food.

Eggs and Poultry

Mr. E. T. Halnan has calculated that to fulfil Dr. Magee's proposals it would be necessary to provide 208 eggs per head of the population each year. Our consumption in 1946, including dried eggs, was 180, which means that we were substantially exceeding our pre-war level. Only 80 of these eggs, however, were home produced. To provide all the eggs we need from home sources, therefore,

would necessitate our raising egg production by about 150 per cent., *i.e.* from about 4,000 million to 10,000 million eggs annually.

Since poultry reproduce so much more rapidly and prolifically than cattle or sheep, the problem of building up new stocks is much less serious. Food is again the most important factor, and apart from supporting new stock it should be possible to raise the present annual production of 100 eggs per hen to 120 eggs by improved feeding. Two sources of poultry food seem possible, more wheat or barley might be allocated, or we might revert to milling flour of 70 per cent. extraction as before the war. This step, which would be strongly resisted by most dietitians as causing a serious reduction in the nutritive value of our bread, would permit the production of an additional 3,300 million eggs each year.

For success in any egg-producing scheme, however, it is necessary that the birds should be kept healthy and free from epidemics. The outbursts of fowl pest, which at present are sweeping the country, have been traced to carcasses imported from Central Europe. Bones, offal, and table scraps from the infected birds are placed in the refuse bucket, and so are included in the food given to healthy birds, with disastrous results. Dr. W. R. Woolridge has roundly condemned the ill-advised action of the Ministry of Food in arranging to import carcasses from areas known to be infected with fowl pest.

Food from the Sea

According to Drs. R. J. H. Beverton and G. C. Trout the annual pre-war catch of fish landed in British ports was about 500,000 tons, including 137,000 tons of cod, 74,000 tons of haddock, 40,000 tons of hake, 33,000 tons of plaice, 10,000 tons of crabs, lobsters and mussels, and the remainder mainly as herrings. In some places these hauls were more than the fishing grounds could maintain, and in the North Sea area in particular the fish became scarce in numbers and small in size. Immense numbers of codfish, however, could always be caught by steam trawlers operating in the Arctic waters around Bear Island, while conditions nearer home have greatly improved as the result of reduced fishing during the war. The herring, which is particularly valuable as a source of calories on account of its high fat content, has shown no sign of being over-fished, even in peacetime in the North Sea.

To increase fish supplies it would be necessary to enlarge and improve our fishing fleets. Questions of preservation are also important both in regard to the transport of fish caught in distant waters and in the prevention of waste when heavy catches are made. The problem of dealing with gluts is particularly urgent with herrings, which should be consumed or preserved within thirty-six hours of catching. With the necessary facilities and capital expenditure there would seem to be no reason why fish supplies should not be increased by 40 per cent. above the pre-war level, which would allow a valuable contribution of 6 g. of animal protein per head per day to the national diet.

Our Lowered Standards

The urgent need for the improved production of foodstuffs of all kinds may be realised with added force if we refer back to the dietary standards which were proposed by a committee of the British Medical Association in 1933. The weekly "rations" recommended for an adult male, and considered to be typical of the consumption of a working man in receipt of good wages, included 1 lb. of beef, ½ lb. of minced meat, ½ lb. of bacon, ½ lb. of corned beef, ¼ lb. of liver, 2 oz. of eggs, ½ lb. of cheese, 1¾ pints of milk, ¼ lb. of cod fish, ½ lb. of butter, 1 oz. of suet, ¼ lb. of lard, 7½ lb. of bread, 1 lb. of sugar, ¾ lb. of jam, ½ lb. of syrup, 5 lb. of potatoes, and ½ lb. of oatmeal, together with tea, vegetables, and legumes. It will be seen that our present diet only approaches these standards in regard to milk and fats, and that our present meat ration is a mere remnant of what we consumed in better days. Bacon has fallen from 8 oz. to 1 oz!

These figures amply bear out Professor Ashby's observation that we no longer enjoy a diet appropriate for a modern industrialised country, but have fallen to a level which would only be expected in a population of impoverished peasants. What, it will be asked, are the effects of our privations on our health and on our vitality and vigour as a nation?

The Effects of Malnutrition

In spite of reduced dietary standards it is still questionable whether bodily health has been affected. The cold, unbiased evidence of annual statistics has not yet shown the increases in the death rate and in the incidence of certain diseases, such as tuberculosis, which would be expected in a malnourished population. The private opinions of medical practitioners, however, are far from unanimous in accepting this evidence at its face value, and at a recent meeting of the Hunterian Society a large majority voted in favour of the view that our present state of nutrition is undermining the public health. Further research is urgently required into methods for detecting early signs of malnutrition. It is equally important that reliable information should be obtained as to the dietary levels below which physical injuries become apparent. The numerous investigations which are proceeding on the Continent should throw light on these points.

The lack of scientific proof that physical injuries

have been caused by our reduced food consumption, however, must not distract our attention from the possibility of serious psychological and sociological effects. It would be interesting to know how many of our women folk have been rendered neurotic by the worries of rationing, and how many homes have been made miserable as a consequence. In industrial workers long continued subsistence upon poor food, and the sense of frustration and hostility which it causes, may reduce the will to work and hamper economic recovery.

The Need for Scientific Guidance

During the war the advice of nutrition experts played a large part in enabling us to maintain our health on reduced resources of food. The adoption of a flour of high extraction, rich in vitamins, and the organisation of animal husbandry with a bias towards milk production, were two corner stones of a successful policy. American help was invaluable in relieving what would otherwise have been a monotonous diet with supplies of meat, bacon, eggs, and numerous other foodstuffs.

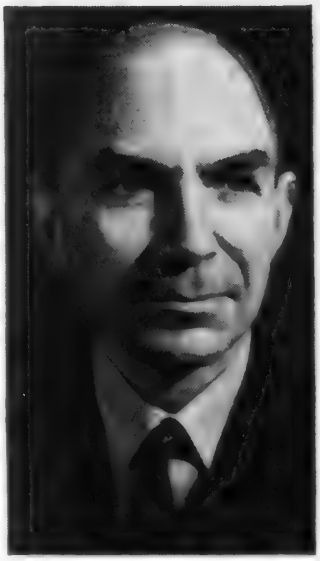
Since the war we have suffered first from the withdrawal of many of the foods which go to make palatable and appetising meals, and more recently from shortages of the staple foods which provide our calories. Under these circumstances the need for wise scientific guidance has become more urgent than ever, and all will wish Dr. Norman Wright every success in his new appointment as Scientific Adviser to the Ministry of Food. As Professor Ashby has pointed out, however, a coherent plan for the best possible nutrition of the country can only be evolved as the result of adequate co-operation and discussion between experts in the various fields relating to dietetics and agriculture. Organisations such as the Nutrition Society, which provide a platform for the free exchange of information and criticism on nutritional topics, therefore fulfil a most valuable function.

At the present austere period in our national affairs our scientists can perhaps help best by assessing the safety margin which still protects us from the first signs of starvation. Their collected and correlated knowledge and advice will be no less essential in the arduous struggle to achieve a better and less monotonous diet, such as that advocated by Dr. Magee.

Facing the Future

Necessity is the mother of invention, and in helping us to face the future the ingenuity and industry of those engaged in manufacturing and processing foods will doubtless play a vital part. History tells of food discoveries which from time to time have revolutionised dietary habits. The introduction of the potato from America has already become almost legendary, while the import of frozen mutton from Australia and the manufacture of margarine are more recent examples.

Let us hope that some such major discovery or development is waiting round the corner. Let us give every encouragement to the groundnut scheme, with its promise of abundant margarine and cattle food. Let us hope that whalemeat may be dressed and garnished to make it really attractive as a human food. Let us not overlook yeast as a human foodstuff, or neglect the possibility of further developments with the soya bean. In a less ambitious mood can we not evolve some simple method of boning and processing the humble herring so that children can eat it without complaints and the smell involved in cooking can be minimised? Is there any possibility of obtaining oil from sunflower seeds harvested in parts of the empire which would otherwise lie barren? Are any important developments still to be expected in the preservation of perishable foods by dehydration, freeze drying, or quick freezing? The enterprise of our food manufacturers has served us well in the past, and doubtless will help us no less effectively in the difficult days which now lie ahead.



Dr. Norman C. Wright, M.A., D.Sc., Ph.D.

BOOKS RECEIVED

Orders for any of the books listed below or reviewed in this issue may be placed with the Books Department, FOOD MANUFACTURE, *17, Stratford Place, London, W.1. It is regretted that under present conditions it is not always possible to supply books by return of post.*

Food Products. By Saul Blumenthal. Pp. 986. London. Price 72s.

Power and Process Steam Engineering. By Douglas Copp, A.M.Inst.C.E., A.M.Inst.GasE. Pp. 173. London. Price 15s.

The World of Learning. Introduction by Dr. Gilbert Murray, O.M. Pp. 520. London. Price £3.

Polish Food Manufacture

THE Polish economic plan foresees an intensified drive to increase and develop cattle breeding, fishing, industrial plant, and fruit tree cultivation. Among the commodities in which important increases of production are anticipated are raw oil, margarine, canned meat and fish, and confectionery. There are good reasons for believing that important targets may be achieved despite great devastations in view of the success of the rehabilitation and reconstruction work carried out, particularly in the western territories, where most of the Polish food processing industry is concentrated.

In the refrigeration industry the Wroclaw (Breslau) plant has been rebuilt and the Szczecin (Stettin) plant is approaching completion. In this latter town there is also a yeast industry operated by thirteen factories, one of which manufactures high-grade yeast extract.

In the "Amada Oleo" establishments at Gdansk seed extraction is carried on with a productive capacity of 10,000 tons per annum, liquid oil with 10,000 tons, raw oil refinery which, producing 1,700 tons monthly, has already exceeded German 1939 production by 200 tons. A margarine factory, with an estimated capacity of 1,000 to 1,200 tons monthly, is almost completed. In Wroclaw several small Lower Silesian factories have been combined into one large oil plant with a capacity of 6 tons of oil per day.

The fish processing industry comprises ninety-two establishments which last year produced 225 tons of canned food, 5,605 tons of smoked fish, and 4,482 tons of salted fish.

Jam Factories

The "Dagoma" and "Frutta" jam factories at Gdansk (total annual capacity 15,000 tons) have been restarted. In Lower Silesia there are already in operation five large fruit and vegetable processing works with a total capacity of nearly 34,000 tons per annum. Three more factories are in the course of reconstruction. There are in the whole country altogether about eighty such concerns, most of them nationalised. In addition there are about thirty subsidiary installations specialising in the production of dried vegetables, sauerkraut, and vegetable wines.

Typical of these factories is the State Preserving Works at Ziebice, Lower Silesia. This is a fully integrated concern operating a whole range of fruit and vegetable processing machinery and a can-making plant. This year's output at the Ziebice plant is estimated at 1,800,000 kilo tins of vegetables and fruit. In addition there is a large capacity for producing dried fruit and vegetables, as well as fruit pulp. A considerable proportion of the Polish production of processed fruit and vegetables may be made available for export purposes in view of the restricted home market for these products. This applies in particular to tinned fruit and dried vegetables.

The difficult problem of supervising the distribution of quality vegetable seeds, scientific supervision of crop cultivation, and the buying of vegetables on behalf of processing factories has now been taken over by Vegetable Growers' Co-operatives, which will also undertake the distribution of produce on national scale.

Milk and Poultry

The milk industry cannot expect a speedy rehabilitation owing to the serious depletion of livestock as well as shortage of dairy and refrigerating equipment. The current output runs at about 60 per cent. of the pre-war total. Efforts are now being made to increase the milk yield of the available cattle population through improved feeding. This is linked with projects to expand acreage under oleaginous plants. Before the war the acreage under these plants was relatively small, and consequently the country has been compelled to import large quantities of foreign oil cake or oil seed. In 1946 the area under oleaginous plants has increased to 190,000 acres—more than half of it was under flax.

During October last the Association of Polish Egg Packing Stations acquired a Dutch-patented egg handling plant. The installation will now permit the utilisation of Grade II eggs for export purposes. They will be broken, pasteurised, and packed in hermetically sealed tins. The centre has already received a delivery from Britain of tinplate, and it is expected that the first cargo of tinned scrambled eggs will be shipped to the United Kingdom in the near future.

A Polish Ministry of Agriculture statement indicates that the country's poultry population is at the moment nearing the 30,000,000 mark. This number includes 22,700,000 laying hens, 2·3 million geese, and 2·5 million ducks. The estimated annual production of eggs in 1948 will be 1,700 million. It is not yet certain what proportion of eggs will be earmarked for export. This may also be affected by the size of foreign orders for poultry and the availability of dressing and refrigerating plant to meet such requirements.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Nationalisation of Transport

POSITION OF "C" LICENCE HOLDERS

Although the operation of "C" licensed vehicles is unaffected by the Transport Act, 1947, many engaged in trade and industry feel uncertain as to whether those public transport facilities which are to become State-owned and operated by the British Transport Commission will, under that control, meet the requirements of the trading community. A statement has therefore been issued by the National Council of the Traders' Road Transport Association dealing with some of the issues arising in consequence of the passing of the Act.

The railway and canal undertakings specified in the Third Schedule to the Act, including the four main line railway companies and the London Passenger Transport Board, are to pass into State ownership on January 1, 1948. In addition, certain undertakings operating under "A" and "B" licences, whose activities consist mainly of the long-distance carriage of goods for hire and reward will also be acquired at a future date.

Apart from certain special exceptions, the haulage undertakings not so acquired will normally be subject to a limit of 25 miles radius of operation, only to be exceeded when a permit has been granted by the Commission, but no indication has been given as to when this restriction will come into force.

When the Act becomes fully effective, traders will have available the State-owned railways, canals and long distance road transport on the one hand, and the privately operated short distance public road transport facilities on the other, in addition to the use of their own "C" vehicles for the carriage of their own goods.

The Minister of Transport's full recognition of the anxiety of the trading community is evidenced by his announcement of the withdrawal for the time being of the clauses dealing with "C" licences, which would have placed mileage restrictions on the use of such operated vehicles. The necessary steps to put the matter right will be taken immediately, however, should this facility be abused.

It was stressed in the course of the discussions through the Central Committee of Transport Users that the bulk of commercial goods traffic was passed to public transport, and assuming a satisfactory service was provided, there could be no reason for supposing that there would be any lessening of the use of State-owned public transport.

Paper Sacks for Flour

Current shipments of flour to the Clyde from Canada and the U.S.A. demonstrate the use of paper sacks as against hessian, jute, or linen. The use of stout paper sacks for cement has become a standard practice and there is no logical reason why flour should not also be carried more extensively in this manner, the makers claiming that these are cleaner, more hygienic, and cheaper. They are used only once, as against the repeated use and sterilisation of fibre bags.

Sterilisation, essential to the cleanliness of the product packed, is a costly and time-wasting process, which could be eliminated by the use of paper sacks which are constructed to prevent seepage and are moisture-resistant to a considerable degree. Extra sacks are carried with such cargoes to use as slip-over sacks, to cover damage by breakages.

The present development is in the experimental stage, and it will be necessary to obtain fuller experience of the sacks in use before any positive deductions can be reached.

Colonial Resources

Moving the second reading of the Overseas Resources Development Bill by which it is proposed to establish a Colonial Development Corporation and an Overseas Food Corporation, Mr. Strachey commended the new departure of the Bill in seeking to promote development through the public corporation with its capital publicly owned and working for public purposes. The operation of the East Africa Groundnuts Scheme, at present being operated for the Government by the United Africa Company, is to be entrusted to the Overseas Food Corporation, who will be responsible to the Minister of Food and who will be confined to the production or the promotion of the production of food and agricultural products.

The following officers have been appointed to the Corporation:

Chairman: Mr. L. A. Plummer.
Vice-Chairman: Mr. James McFadyen.
Members: Sir Charles Lockhart, Mr. J. Rosa, and Mr. A. J. Wakefield.

Mr. Frank Samuel, who first suggested the project and who is managing director of United Africa Company, and Lord Rothschild have accepted invitations to serve as executive members.

Food Investigation Board

The Lord President of the Council of the Department of Scientific and Industrial Research has appointed Professor Sir Frank Engledow, C.M.G., F.R.S., as chairman of the Food Investigation Board, D.S.I.R., in succession to the late Sir Joseph Barcroft.

The task of the Food Investigation Board is to advise generally on the conduct of research on the properties and behaviour of foodstuffs and on the scientific problems, including physical and engineering problems, involved in their storage and transport. The research stations of the Food Investigation Organisation are:

The Low Temperature Research Station at Cambridge, dealing with meat and other animal products (except fish), fruit, and vegetables. It also deals with the corrosion of metals through contact with foodstuffs.

Torry Research Station at Aberdeen, dealing with the handling, storage, and processing of fish.

Ditton Laboratory, East Malling, Kent, dealing mainly with problems of fruit and vegetables on a larger scale than is possible at Cambridge.

Self-Adhesive Tapes

Prior to the war, Durex Abrasives, Ltd., had created a wide demand for their self-adhesive tape products, when the declaration of war resulted in supplies being withdrawn from the open market. In common with manufacturers of many other commodities, they devoted all their output of tapes to the furtherance of the war effort in which the need of the Services took first priority followed by the demands of the Ministry of Food and manufacturers engaged upon essential war contracts.

This turnover to the war effort resulted in the temporary severance of normal business relations, but the company is again in a position to cater for the ever increasing commercial demands for their self-adhesive tapes. That the company is confident this demand will be maintained is proved by the fact that they are planning to build a new factory at Gorseinon, South Wales, which will be the most modern of its type in the world.

Factory Extensions

Plans have now been passed for extending and modernising the factory of The Beddington Nut and Produce Co., Ltd., at Swanley, Kent, who, before the war, had a considerable business in *glacé* cherries and edible nuts, and oporated a pulping plant for Kentish grown fruit. The war put a stop to the processing of cherries and the import of nut kernels, and in view of their facilities the company were appointed licensed preservers by the Ministry of Food concentrating all their energies and experience on the preservation of fruit, both for the Ministry and the jam trade generally.

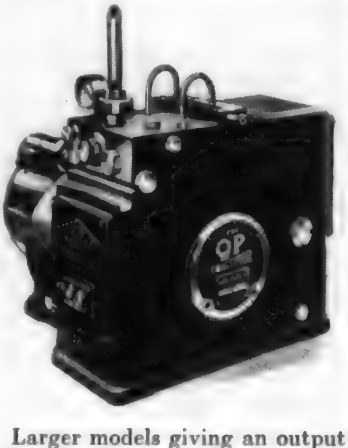
They are now resuming the processing of *glacé* cherries and peel, the scale of production being somewhat limited, however, by the sugar control.

The company recently acquired Wyles Preserves, Ltd., who were well known before the war for their specialities such as "Cherryettes" for the bakery trade, the manufacture of which it is hoped to resume when present restrictions are removed.

Power Emulsifiers

Used in the production of edible mixtures, Q.P. power emulsifiers, manufactured by Ormerod Engineers Ltd., can be installed in the lowest point in any manufacturing system and used to pump the emulsion over considerable distances to storage tanks or bottling equipment.

A small model, equipped with a ½ h.p. motor, gives an output of 25 gall. per hour at 500 lb. pressure, or at 1,000 lb. pressure with a ½ h.p. motor. A relief valve is incorporated on the machines by which the globule size of the emulsion can be varied through adjustment of the pressure. Agitators and jar-filling attachments, with metering device, can also be supplied.



Larger models giving an output of 100 gall. per hour at 500 lb. pressure or 60 gall. per hour at 1,000 lb. pressure are driven by a 1 h.p. motor and have a twin ram pump.

The Chemical Club

The following officers and members of Committee were elected at the annual general meeting of the Chemical Club to serve during 1947-1948 :

President: T. H. Fairbrother.
Chairman of Executive Committee: S. I. Levy.
Hon. Secretary: A. J. Amos.
Hon. Treasurer: R. L. Stephens.
Committee: E. A. Bevan, E. Chilman, H. W. Cremer, W. Dixon, F. A. Greene, F. J. Griffin, E. H. T. Hoblyn, O. Jones, J. H. Robertson, and J. F. Ronca.

Obituary

We regret to record the death on November 3, 1947, of Mr. Ronald W. Stevenson, M.A., F.C.S.

Born on February 3, 1893, he was the elder son of the late Mr. William Stevenson, founder of the firm Stevenson and Howell established in 1882, and he joined the company in 1919, being elected to the Board of Directors in 1920.

In 1930 he succeeded his father as managing director jointly with Mr. V. J. Tilley, and in 1946 was elected chairman of the company.

He was well known in trade circles, particularly as a member of the Executive Committee of the British Essence Manufacturers Association and as vice-chairman of the Essence Export Group, also as a member of the Committee of the Essential Oils Importers Section of the London Chamber of Commerce.

He will be greatly missed by his colleagues of the Board of Directors of Stevenson and Howell, Ltd., the staff of the company, and no less by his many friends and associates in the various trade interests with which he was closely connected.

Purchase of Assets

The whole of the assets of the old established firm of Newton, Bean and Mitchell have been purchased by Crofts (Engineers), Ltd. Specialising in the manufacture and repair of steam engines, condensing plant, compressors, and power transmission accessories, the company have a world-wide connexion, their engines and plant operating in most countries. The business will be carried on under the same name, and with the same employees and management. After complete reorganisation, Crofts (Engineers), Ltd., intend to move certain of their manufactures to Dudley Hill.

Appointment

The appointment of Mr. D. C. Hagen as their chief draughtsman as from November 3, 1947, has been announced by G. and J. Weir, Ltd.

Sales Changeover

The sales of the "Comet" conveyor belt lacing system for collieries in South Wales, formerly handled by Tom Smith and Clarke of Swansea, has been taken over by the Mastabar Belt Fastener Co., Ltd., at 14, Westgate Street, Cardiff. Sales in Lancashire, Cheshire, Staffordshire, and North Wales, which have been handled by J. H. Whittam, Ltd., of Burnley, will be taken over by the same company at Avenue Parade, Accrington, Lancs.

Preservative Wrapping

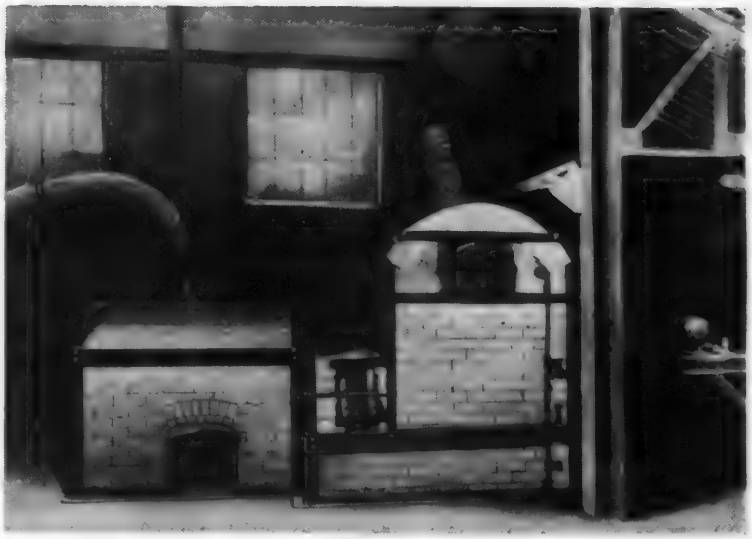
As work goes forward on the erection of the Goodyear factory at Wolverhampton for the production of Pliofilm, there comes almost daily news of fresh fields in which it will be used.

Pliofilm is the revolutionary preservative wrapping material which came into prominence during the war. Its principal appeal to Britain at the moment should be in the preservation of perishable foodstuffs.

The results are at hand, from careful laboratory research work in America, of the preservation of such foods as cheese, coffee, pickles, dried and fresh fruits, meat products, fish etc., for unprecedented lengths of time. Tests have shown that these preserve their original freshness and taste for many months. In the matter of manufactured articles, Pliofilm precludes most of the deteriorating effect of shop wear and storage.

Tasteless and odourless, it is a transparent rubber hydrochloride film produced by casting over a solvent solution. It has unique physical properties entirely unlike the material from which it is composed. There are two general types—normal and plasticised. The normal variety is used primarily for wrapping and packaging, while the plasticised film is generally used where wearability is the primary requisite—that is, in the manufacture of protective wearing apparel, household and merchandise articles.

Normal and plasticised Pliofilm are both crystal clear, but a wide range of transparent and opaque colours will be available.



Coke semi-producer furnace providing controlled heat by gasification without moving parts.

Semi-Producer Furnaces

Coke-fired semi-producer furnaces, providing controlled heat with practically automatic firing, without moving parts, without smoke or contamination, and with the minimum of attention, are made in standard sizes to burn from 20 lb. to 10 cwt. per hour. Large numbers are now in use in conjunction with plant for drying and heating different products, and have been adapted as standard by various makers of drying plants. They may also be used for steam generation, being a convenient and efficient Dutch oven arrangement for the operation of small steam boilers such as the vertical and cylindrical types.

The design is that of a brickwork furnace of domed type containing a large combustion or gasification chamber which is kept filled with a deep layer of coke. Into this chamber air is blown from a fan with control by means of a cold air admission damper, while the setting also includes a gas port and a spark trap, the combustion being regulated according to the operation of the air inlet fan.

Good gasification is given without any excess air, and the furnaces give continuous combustion without any excess air, that is with a high CO_2 and low free oxygen content in the exit gases.

Coke lends itself particularly well to partial gasification firing of this description, differing from bituminous coal where the matter is complicated by the formation of black smoke by unburned volatile matter with deposits of tar and other familiar troubles.

The furnace is the outcome of extended research and experience by London and Counties Coke Association in conjunction with the National Federation of Gas Coke Associations.

Second Cookery Course

A companion to the "Bride's First Cookery Course," an attractive pictorial booklet, produced with several pages in colour, has been published by the Good Housekeeping Institute. Priced at two shillings, it contains over twenty lessons in cookery, with every process photographed and described step by step. It contains a great variety of recipes—some simple and some more elaborate—chosen by the Institute as likely to prove useful to the average person learning to cook under present-day conditions.

Scientific and Technical Research

ITS VALUE IN OVERCOMING PRESENT ECONOMIC DIFFICULTIES

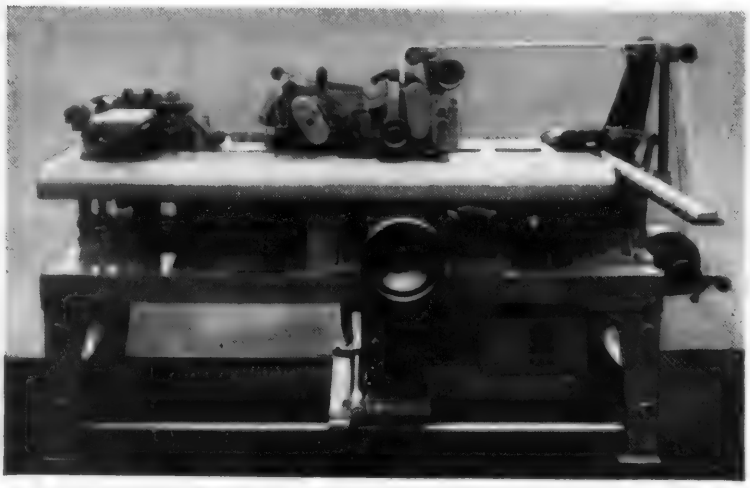
The recently published statistical survey carried out by the F.B.I. Industrial Research Secretariat to assess the scientific and technical research effort in British industry's laboratories and works was based on returns from 420 firms (each spending not less than £1,000 a year on research) covering, it is estimated, some 75 per cent. of British industry's total research effort, on which about £30,000,000 a year is now being spent.

The more than ten-fold increase in the expenditure by industry on research during the last fifteen years shows how dependent industrial progress has become on scientific work and its application, and demonstrates the necessity, under the present more difficult conditions, of the need for the rapid expansion of scientific facilities within industry in the interest of increasing industrial production and export trade. It is encouraging that three firms out of every five doing research plan an expansion of their activities.

The value of industrial research as an instrument and technique to help overcome the present economic difficulties is emphasised by the fact that the major part of industrial research at present being carried out in this country is directly related to manufacturing process and production problems and so is steadily promoting industrial efficiency and competitive power.

The importance of each firm of any size possessing a scientific staff commensurate with its technical needs must again be stressed; no firm is too small to have at least one individual charged with the responsibility of keeping constantly under review the application of scientific work to its activities.

The present economic crisis must mean changes in industrial production and practice as a result of modified export needs to suit new markets, cuts in volume of imported raw materials, and changes in their character where home-produced raw materials can be substituted for those previously imported. All these will call for greatly increased efforts from industry's research staffs if the quality and volume of products are to be maintained and improved under these severely limiting conditions.



The ice cream wrapping machine with an output of 150 to 160 bricks per minute.

Fruit and Vegetable Canning

For some considerable time past the Smedley organisation have been building up an important productive and processing industry in central Scotland, located mainly in Dundee and Perthshire. A new development, announced by Mr. S. W. Smedley, chairman of the National Canning Co., Ltd., is the purchase of the premises formerly owned by Farina Factories, Ltd., at Monikie, near Dundee, for conversion into a canning factory for fruit and vegetables grown in the surrounding area.

Change of Address

As from November 7, 1947, the Export Sales Division of J. H. Fenner and Co., Ltd., was transferred to Marfleet, Hull. The Accounts Department of the Company moved back from Cleckheaton to Hull on December 8. The V-Belt and Woven Belting Sales Division and Central Purchasing Division remain at Beck Lane Mills, Heckmondwike, Yorkshire, the Leather and Mechanical Leather Sales Division at Marfleet, Hull, and the Mechanical Rubber Products Sales Division at Winewall Mill, Colne.

Ice Cream Wrappers

Capable of wrapping ice cream bricks already cut at a speed of from 150 to 160 per minute is the ice cream wrapping machine, manufactured by Rose Brothers (Gainsborough), Ltd. The bricks are fed into the machine on an endless belt and are automatically transferred into a chain which carries them to the wrapping mechanism where the grease-proof paper previously fed and cut off from a reel is neatly folded around. Triangular folds are made at both ends and the blocks delivered six at a time on a table situated at a convenient height for packing. All parts of the machine which come into contact with the ice cream are rustless, and when not in use can be cleaned down with steam under pressure. The machine is complete with its own electric motor drive.

Alliance's New President

At the annual general meeting of the Ice Cream Alliance held at Olympia, London, on October 30, Mr. J. H. Ryder, vice-chairman of the North-West Division and chairman of the Liverpool Branch, was elected President in succession to Mr. Anthony Facchino.

During the Presidential address Mr. Facchino said that this year the allocation of skimmed milk powder had enabled a much better and more nutritious ice cream to be made, though for the majority of makers the fat allocation had remained very small. He viewed with concern the outlook for the next year on account of the skimmed milk powder position, but assured the meeting that every possible effort would be made by the Executive Council to obtain supplies, adding that the suggestion had been made already to the Ministry of Food that supplies might be obtainable from a sterling area, especially New Zealand, from which large quantities of milk powder were received before the war.

The annual report and statements of account were accepted and approved, and warm tributes were paid to Mr. Facchino for his strenuous labours during the two years of his Presidency of the Alliance.

Catering through the Years

Sponsored by the National Council for Hotel and Catering Education and organised by the Empire Tea Bureau, the exhibition "300 Years of Catering," which will remain open until February or March, is being held at the Tea Centre, 22, Regent Street, S.W.1.

Designed to summarise the history and progress of catering during the past 300 years and to give an indication of future developments, and of the steps being taken for the education of newcomers to the catering trade, the exhibition brings together elaborate dioramas reconstructing old London eating houses, "period" cooking utensils, old prints, menus, and other exhibits reminiscent of the days before rationing.

Scottish Fish Industry

The Secretary of State for Scotland has been approached by the Highland Advisory Panel, consisting of M.P.s for the Highland areas, with proposals for the development of refrigeration and processing of fish at Wick and Stornoway. These proposals have been closely scrutinised by the Herring Industry Board, who have refused to consider them on a commercial basis. It is possible that Stornoway may receive preferential treatment in view of its distance from mainland markets, although the services were originally refused and located instead at Shetland.

Protective Clothing

Specialising in the production of garments suitable for manufacturing and distributing organisations in all trades, the South Wales and West of England Standard Manufacturing Co., Ltd., supply a large number of Britain's food industries with this particular type of apparel.

Garments of all descriptions and the manufacture of overalls to special designs are included in their range of production. All clothing is produced in an up-to-date factory in South Wales under conditions certified by the Institute of Hygiene.

Ion Exchange in Industry

DEVELOPMENTS AND OPERATING PROCEDURES

In the past, the principal application of ion exchange has been in water softening, but it has now developed to so considerable a degree that it is creating increasingly widespread interest in many industries. Among other things it can now be used in such operations as the purification of sugar and other organic chemical solutions from dissolved mineral salts. As pioneers in this work, the Permutit Company has already accumulated valuable information, both in operating technique and design of equipment.

In normal operation, ion exchangers give up an ion A from their structure in exchange for an ion B in the solution which is being treated, and they are used until they are saturated with ion B and no more replacement of B by A takes place. By treatment with a suitable solution of the ion A, they are then regenerated for further use and it is possible to recover the ion B from the regenerating solution in more concentrated form than in the original solution.

Ion exchange processes are most useful in solutions of low concentration and may be used for extracting valuable ions from solutions too dilute to be treated in any other way. As the concentration of the solution treated increases, the volume between regenerations decreases in proportion, until a point is reached when the process is no longer economical.

The amount of regenerant required for the exchange process is almost invariably more than the theoretical. With efficient plant design the consumption is minimised but the actual consumption must be worked out for each particular case.

Where valuable substances are being recovered, they are usually obtained as only a relatively concentrated solution of 2·5 per cent., thus requiring a further concentration by evaporation or other means.

Operating procedures have been developed so that in many cases a much higher concentration is possible; in some cases from initial solutions containing less than 0·5 per cent. a recovery effluent containing over 15 per cent. has been obtained.

While ion exchange is not an economical proposition for all processes, particularly when high concentration of the influent liquor is involved, there are many bordering cases in which difficulties can be successfully overcome by those possessing long and varied experience in the handling of ion exchangers and the design of equipment.

U.S. Scientific Exchange Mission

TO BE SET UP IN LONDON

A mission on science and technology will be established soon in the U.S. Embassy in London to direct the exchange of scientific information and personnel between the United States and Great Britain.

The mission, consisting of a small group of scientists and engineers, will be headed by Professor Earl A. Evans, Jnr., noted American biochemist and educationalist. Its activities will cover fields of organic chemistry, biochemistry, physics, biology, and agronomy.

The British Government already maintains a British Commonwealth scientific office in the United States which is charged with duties similar to those which the U.S. mission will be assigned.

Mr. Steelman, assistant to the President, in a letter to Mr. Herbert Morrison, Lord President of the Council, expressed the hope that the United States would set up scientific missions in other countries in the future. "As we gain experience from the work of this mission in Great Britain," he said, "we hope to be able to undertake similar activities in other countries, in the firm conviction that the increase of knowledge through the sciences is one of the goals of all free peoples."

Mr. Steelman explained that establishment of scientific missions was one of the recommendations included in a series of five reports on "Science and Public Policy" which he had prepared. His statement announcing the new mission listed the following functions with which it will be charged:

"1. Aiding and facilitating exchange of scientific personnel and information between the United States and Great Britain.

"2. Developing and maintaining close personal contact with British Governmental agencies and other research institutions in the United Kingdom.

"3. Answering enquiries originating with the United States Government Departments and scientific agencies in the United States with respect to particular developments in Great Britain.

"4. Stimulating exchange of scientific and technical reports, especially where these are not generally available through usual channels. Results of the mission's work will be furnished to interested government agencies and to scientific and engineering societies in the United States for further dissemination to the whole scientific and engineering community."

Dr. Evans, 37, is chairman of the department of biochemistry at the University of Chicago. He is a member of the Biochemical Society of Great Britain and various U.S. scientific societies. He was a Rockefeller Fellow at Sheffield, England, in 1940-1941.

The Institute of Brewing

The following meetings have been arranged for the London Section of the Institute of Brewing:

1948.

Jan. 12. Annual General Meeting and paper by Mr. W. T. Smith.

Feb. 9. "Brewing Sugars," by Mr. J. Leslie Wild, B.Sc., A.R.I.C.

Mar. 8. "From Cask to Consumer," by Mr. J. W. Scott.

Apr. 12. "Recent Developments in Filtration Methods for Bottle Beer," by Mr. D. P. S. Fox.

All meetings are to be held at the Horse Shoe Hotel, Tottenham Court Road, London, W.1, at 6 p.m.

New Rodent Exterminator

The new compound, R.C.R., is being produced by Rodent Control, Ltd., for the destruction of rats and mice. In appearance it is similar to bran and it is unlikely to be affected by extreme cold or heat. It can be applied more than once within two months if dry and reasonably clean, and has a gradual dehydrating effect on all rodents, only a very small percentage, if any, being seen after death.

Industrial Wales

The latest complete list of members of the Industrial Association of Wales and Monmouthshire representing all the important industries operating within that area has been issued in the form of a booklet. Aimed at fostering trade and industry for Wales and Monmouthshire and uniting the industrial resources of that area to help secure a continued and expanding prosperity, the Association has been established as an independent organisation which is immediately available to help in any matter concerning the members' own particular interests.

International Film Association

At a joint congress of the *Institut de Cinématographie Scientifique* and the Scientific Film Association held recently in Paris it was unanimously decided to form the International Scientific Film Association.

Under the provisional constitution agreed by the delegates from twenty-two countries the Association will hold an annual meeting to be held in different countries by invitation, but in the interim period its affairs will be managed by a Council comprising five officers and seven other members.

The Council for the following year will be:

President: M. Korngold (Poland).
Vice-President: J. Maddison (Great Britain).
Vice-President: Professor Pinto (Brazil).
Hon. Secretary: M. Jean Painlévé (France).
Hon. Treasurer: M. Sallaz (Switzerland).
One Delegate from Australia, Austria, Belgium, Canada, Czechoslovakia, Malaya, and Mexico.

All countries not represented at the congress will be invited and the Association will be concerned with all aspects of technical and scientific film matters, and information will be exchanged through the office of the Association to be established in Paris.

The British delegation were asked to arrange for the next congress to be held in Great Britain in October, 1948, and arrangements to this end are being made by the Scientific Film Association of Great Britain.

Mr. S. Spencer

The sales of R. A. Brand and Co., Ltd., of London and Manchester, are now in the hands of Mr. S. Spencer, who has been appointed General Sales Manager.

Mr. Spencer has an extensive knowledge of retail and distributive trades and the packing industries, and of package development and presentation. He is in touch with merchandising developments throughout the world, and is a founder member, and member of the Council, of the Institute of Packaging.

Horlicks Ltd.

A final dividend of 16¾ per cent. actual, less income tax at 9s. in the pound, for the year ended March 31, 1947, was recommended at the ordinary general meeting of Horlicks, Ltd., Lieut.-Col. J. N. Horlick, O.B.E., M.C., chairman, presiding.

Fillerys Toffees

At the thirteenth annual general meeting of Fillerys Toffees, Ltd., Sir Herbert Morgan, K.B.E., the chairman, mentioned the encouragement which had been given to the industry to export, particularly to the hard currency areas. Great interest was being shown by purchasing countries.

Touching upon the difficulties arising out of the fuel shortages, Sir Herbert mentioned that the company was in process of converting its boilers to work on oil to avoid any stoppage that might occur by reason of shortage of coal and, by providing a generating plant which, when installed, would produce one-third of the electricity load, it would be possible to avoid the closing of the factory for one day a week, which was necessary at present.

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British Sugar Corporation

At the eleventh annual ordinary general meeting of the British Sugar Corporation, Ltd., Lieut.-Col. Sir Francis Humphrys, G.C.M.G., G.C.V.O., K.B.E., C.I.E., the chairman, mentioned that the tonnage of beet brought to the factories reached the enormous total of 4,522,140 tons (nearly 1,000,000 tons above the average) and the sugar manufacture—in terms of white sugar—amounted to 556,731 tons, sufficient to provide a weekly ration of 8 oz. for a whole year to 47,000,000 people. Sir Francis paid tribute to the splendid team work shown by growers, hauliers, railwaymen, and factory staffs who toiled day and night during the severest winter this country had experienced since the industry was started more than twenty years ago, and succeeded in harvesting 99 per cent. of the crop in a campaign which extended into March.

Sir Francis said that whatever might have been the position up to 1939, it would be misleading to suggest that in present circumstances the deficiency payment was a measure of the cost to the taxpayer of the home-grown industry. Indeed, never had the value to the country of the home-grown sugar industry been greater than it was today.

During the war the United Kingdom took all the sugar it could get from the Empire and it was lack of shipping that prevented more sugar being imported from other countries. Today it was the lack of dollars that restricted our sugar purchases from Cuba and San Domingo, and there seemed little prospect of the Empire being able to fill completely the gap in our total requirements. It was clear, therefore, that the beet sugar industry occupied a high place as a dollar saver, since the sugar produced at home last season would have cost us no less than $72,000,000 if it could have been bought at Cuban official prices. Mentioning the Government's long-term plans for the industry, the chairman said that it aimed at an expansion of the pre-war acreage and an increase in factory capacity. The Ministry of Food was assisting the policy of re-equipment by including in the depreciation allowances special initial allowances calculated on the same lines as those granted under the Income Tax Act, 1945.

A dividend of 4¼ per cent. less income tax was recommended. This was the same distribution as for the last seven years.

OBITER DICTA

● A calorie can be described as a horse power of food.—*Mr. E. P. Smith, M.P.*

● Displacing the over-ripe tomato from its pride of place, the potato has become a definitely political vegetable.—*"New Statesman and Nation."*

● If we cannot have all the food we would like, we can at least have civility. Civility does not add to costs, but increases profits. — *Dr. Edith Summerskill.*

● "I scarcely ever touch a potato," said the woman in the greengrocer's shop, "but since they were rationed I take the full allowance, of course."—*Peterborough in "The Daily Telegraph."*

● The answer to the world's food shortage cannot come through a materialistic approach—it must come through divine guidance.—*Mr. Albert S. Goss, a leading agriculturalist of the United States.*

● Although civilisation has advanced in science to the theory of nuclear fission, we have yet apparently to learn that it is expedient to keep the cat out of the confectionery shop window. —*"Confectionery News."*

● Every fish I taste is exactly the same. I was brought up to understand that around Britain there are soles, halibut, and plaice, but all the fish served in restaurants and trains are exactly alike. — *Sir Henry Morris-Jones, M.P.*

● I have just come across a brilliant idea which I feel it my duty to pass on to all fathers immediately. It is nothing less than the perfect toy to keep children quiet! You put the child, (age about three) in the bath and pour in a pound of sprats.—*Letter to the "Daily Express."*

● Every farmer who owns a few livestock is marked down automatically as potential prey by unscrupulous black market parasites. It is, in fact, people like these whom we have largely to thank for the size of our meat ration.—*Mr. B. W. Rattigan, prosecuting for the Ministry of Food.*

Canteen Equipment

Shown at the recent exhibition of canteen equipment organised by the Tea Bureau in South Africa were gas-operated café sets and water boilers, manufactured by the British firms of James Stott and Co., G. F. E. Bartlett and Sons, Hodgkinson and Co., and W. J. Hubbard and Sons, Ltd.

The Tea Bureau of South Africa stages an exhibition of tea-making equipment.

Acid-Resistant Apron

A plastic apron claimed by the manufacturer to withstand fats, acids, and salts peculiar to the meat packing industry has been developed by the Coronet Plastics Co., Chicago. The new thermo-seal aprons feature all-plastic grommets and die-cut edges for extra protection and longer wear. They are available in two colours and in three standard sizes.

About a year ago the manufacturer found that vinyl plastic was not suited in all cases for use in the packing industry and set out to develop a coating substance which would stand up under all conditions. The research department of Bakelite Corporation developed a non-migratory plasticiser which was used in sample aprons given to seventeen packing plants for testing. Results of the tests show the material does not stiffen and crack and that it is also resistant to the corrosive action caused by fatty acids.

Meat and Sugar from Australia

The Journal of the Australian Meat Board points out that more meat will be available for export following recent rains in all the Eastern and most of the Southern areas of Australia.

Official statistics released earlier this year showed that there were fewer sheep, cattle, and pigs in Australia than a year ago owing to drought conditions, but recent rains in Queensland, New South Wales, Victoria, and South Australia had created particularly good seasonal conditions though this had been offset to some extent by dry conditions in Western Australia.

Australia will export 100,000 tons of sugar this year, according to Senator B. Courtice, Minister for Customs. Australian sugar, said Mr. Courtice, was distributed by the International Food Council, but it was realised in Australia that the greater the quantity exported, the more there would be for Britain.—*Reuter.*

The Benares Hindu University

The Silver Jubilee celebrations of the Department of Industrial Chemistry of the College of Technology of the Benares Hindu University were held on December 12. To commemorate the twenty-five years' work of this department which now constitutes the College of Technology, it is proposed to establish a first-class reference library covering all the subjects coming within the purview of the College. To this end, the Principal of the College, Dr. N. N. Godbole, has issued an appeal for funds to assist in the equipment of the library which will undoubtedly prove a valuable asset to the successful working of the College.

Meat Company Purchase

The Argentine National Economic Council has approved the terms of an agreement for the purchase of the British-owned Smithfield and Argentine Meat Company by the Argentine Meat Producers Corporation.—*Reuter.*

IEFC to be Dissolved

The International Emergency Food Council has accepted a Food and Agricultural Organisation recommendation that it should be dissolved and its functions transferred to the FAO Council, the dissolution to take effect as soon as a majority of the 85 member governments concur in the decision.

The Council will also establish a committee, to be known as the International Emergency Food Committee, with functions similar to those of the Central Committee of the International Emergency Food Council and with membership identical in the first place with the Central Committee.

Vegetarian v. Meat Diets

Research completed at the University of Chicago shows that laboratory animals fed on vegetarian diets provided additional evidence that a purely vegetarian diet (as contrasted to an omnivorous diet built around meat proteins) tended to shorten life. A report on the research, conducted by A. J. Carlson and F. Hoelzel, of the Department of Physiology, states that the growth of rats fed on omnivorous and vegetarian diets was observed during longevity studies and during additional short term studies, and that rats fed purely on vegetarian diets were stunted in growth. Rats fed on omnivorous diet lived significantly longer and the life span was more uniformly prolonged by the intermittent fasting of rats on an omnivorous diet than in rats on a vegetarian diet.

According to the report the rats on omnivorous diets got about 35 per cent. protein (chiefly meat protein) and 28 per cent. fat.

The Irish Bacon Industry

Though every householder in Eire is aware that the Irish bacon industry is not in a prosperous condition, the chairman of the Pigs and Bacon Commission has strenuously denied assertions that the industry in Dublin was almost extinct, adding that the bacon manufacturing concerns there were in a much better position now than they had been for a number of years.

Scarcity of feedingstuffs to replace the maize formerly imported from South America and the U.S. is given as the main reason why Eire this year has only 43,800 breeding sows compared with 95,317 in 1939.

Bacon factories are accepting every pig available irrespective of cost, and when imported feedingstuffs are once more plentiful there is little doubt that the Irish farmer will revert to the production of pigs on the pre-war scale and that Irish bacon will regain its former place in foreign markets.

Salt Dispenser

The dome, hopper, cylinder, and skirts of this new salt dispensing machine are of Plexiglas. The equipment makes possible efficient handling of anhydrous calcium chloride in commercial canning of tomatoes.

Used to prevent softening of tomatoes due to processing heat and agitation during shipment, and as a cell strengthener, the calcium chloride presented a problem because of its hygroscopic property.

The plastic is unaffected by the salt and permits continuous inspection of the flow as well as the automatic control mechanism regulating the quantity added to each can. The plastic parts are assembled with a special cementing technique, with tight bonding of plastic to metal.

Food and Container Research

Composed of representatives of companies in the food container and allied industries together with representatives of the Quartermaster Food and Container Institute for the Armed Forces, the Associates of the Food and Container Institute has been formed in Chicago for the dissemination to members of fundamental scientific information pertaining to food and containers and will assist in co-ordinating the research activities of many of the groups now engaged in food and nutrition studies.

The new organisation will also assist in minimising unnecessary duplication of scientific research by making available to industry, educational and research institutions, and governmental agencies, comprehensive information on present developments in food and container research.

The Freez-Pak portable refrigerator.

Slovakian Meat Factory

A new factory with an estimated annual capacity of 50,000 pigs and 25,000 cattle has been opened at Presov, Slovakia, for the production of preserved meat. —*Reuters Trade Service.*

The Food Industry Exposition

Providing display facilities for manufacturer meetings with wholesalers, chains, and other executives of the food industry, the second annual Food Industry Exposition will be held from January 18 to 21, 1948, on the Atlantic City Steel Pier, concurrently with the big food trade meeting of the year.

Threshing Machinery

Capable of threshing all kinds of pod crops cleanly and at high speed, a new machine working on ball bearings has been tried out at the Orange River Settlements, South Africa. The crop is fed to the drum by a conveyor belt and then scraped, cleaned, and bagged, the operation for peas taking four minutes and that for beans only one minute.—*Reuters Trade Service.*

Complications of Exchange Problems

REDUCTION IN NUTRITIONAL STANDARDS

A request that the International Monetary Fund should co-operate with the Food and Agricultural Organisation in preparing a report on practical measures which might be taken to alleviate monetary exchange difficulties which are today aggravating problems of food and nutrition in many countries was contained in a recent report submitted to the Plenary session of the World Food Council.

Dealing with short term difficulties facing the world in food distribution and agricultural production, the report declared that developments in the international exchange position in recent months had reduced the ability of many countries to finance essential food imports. The point had been reached where some countries were unable to take allocations of scarce commodities and their nutritional standards were being reduced, not so much by world shortages of foods but lack of means to pay for them.

The report, which was adopted unanimously, called on all food producing countries to make maximum sowings of cereals, including rice, during 1948.

Estimating the gap between world fertiliser nitrogen needs and supply in 1947-1948, the report devoted considerable attention to means of increasing the supply. The conclusion was reached that the limiting factor in European fertiliser production was not so much coal as lack of equipment resulting primarily from war damage. The report urged that greater attention should be paid to the output of organic nitrogen and asked fertiliser nitrogen producing countries to reconsider the possibility of increasing output for export and diverting some tonnage now used for industrial purposes.

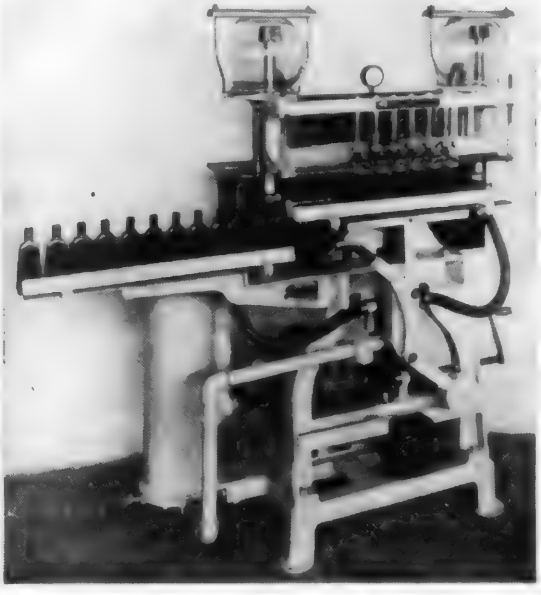
Memoranda accompanying the latter recommendation revealed that infestation losses of cereals in 27 FAO member countries from 1937-1940 inclusive totalled almost 25 million metric tons, sufficient to feed about 135 million adults for one year.—*Reuter.*

Poland's Sugar Industry

Twenty-four sugar refineries in Eastern Poland have been restored and the repair of another twenty-six plants in Western Poland is well under way.

It is believed that these fifty plants which had been destroyed will be working to capacity this year, bringing Poland's sugar refining capacity to 500,000 tons.—*Reuter.*

AMERICAN PACKAGING DEVELOPMENTS



Above: A semi-automatic vacuum filler operating at speeds ranging up to 40 per minute.

Right: A semi-automatic inverted bottle cleaner operating at speeds ranging up to 50 per minute.

News from the Ministries

Pickles and Sauces

In accordance with the policy of relaxing licensing control as and when circumstances permit, the Minister of Food has decided that, on and after November 16, a licence will no longer be necessary to sell pickles and sauces either by wholesale or retail.

The consequent amendments to the Food (Restrictions on Dealings) Order, 1948, and the Food (Licensing of Retailers) Order, 1945, have been made.

Canned Meats

Limited quantities of canned meats may now be imported under individual licence from France, Denmark, Holland, Norway, Hungary, Czechoslovakia, Poland, and Yugoslavia.

Importers are advised that the entry of goods which are indistinguishable from those for which maximum prices are prescribed in the Meat Products and Canned Meats (Control and Maximum Prices) Order will be approved only subject to the price and other provisions of that Order and to the provisions of the Food (Points Rationing) Order.

Canned meats for which maximum prices are not already prescribed in the Control Order will not, as a general rule, be subject to price control, but in considering applications for such goods the Ministry will have regard to the prevailing prices of controlled types. Purely luxury types of canned meats are unlikely to be approved.

Applications for Board of Trade import licences on form ILD/A, obtainable from the Import Licensing Department, Board of Trade, 189, Regent Street, London, W.1, should be made direct to the Meat and Livestock Division, Ministry of Food, Bryn Euryn, Colwyn Bay, accompanied by a sample of the product.

Importers are asked not to apply without first ensuring that export licences for the quantities offered will be issued by the authorities of the exporting countries.

Imported Grapes

Maximum prices will be prescribed for the new imports of South African grapes that will be coming to this country under the recent agreement with South Africa and these will also apply to all other imports of grapes. The Order will come into effect about the middle of January, 1948.

Mission to Canada

A Mission led by Sir Percivale Liesching, Permanent Secretary of the Ministry of Food, and including representatives of the Treasury, Board of Trade, Bank of England, and the Ministry of Food, left for Ottawa on November 18 to discuss with the Commonwealth authorities questions relating to finance, trade, and food supplies.

Anglo-Danish Eggs Agreement

It has now been agreed between the British and Danish Governments that the protocol of July 31, 1946, which regulated Anglo-Danish trade in eggs, bacon, and butter shall be superseded so far as eggs are concerned by a new protocol embodying the following provisions:

(*a*) The average prices for the 1947-48 season and the 1948-49 season shall be increased to 26s. per long hundred.

(*b*) The quantities for both seasons shall remain at 85 per cent. of the total exportable surplus.

(*c*) The period shall be extended until the 1949-50 season, during which year a minimum price of 20s. per long hundred will be guaranteed for a quantity amounting to the average shipments of the preceding two seasons plus 50 per cent.

(*d*) The quantity of eggs which Denmark may pickle shall be increased to 5,000 tons.

(*e*) The Danish authorities may call for a review during 1948 of prices for 1948-49 season, and failing agreement they will send 50 per cent. of their exportable surplus at 26s. per long hundred.

Sugar Allocations

The reduction by 25 per cent. of the total allocations of sugar for manufacturing purposes, which is one of the Government's measures to save dollar expenditure on food, will take effect from January 4, 1948.

Amendment to Preserves Order

An Order freeing home-produced honey and imported guava jelly from price control on and after November 9, 1947, has been made by which it is also provided that any blend of honey containing imported honey should be treated as imported honey, which will remain subject to price control.

Resignations and Appointments

Mr. J. N. Dick, formerly Area Egg Officer for Liverpool, has been appointed Chief Egg Officer in succession to Mr. James H. Carmichael, Chief Egg Officer for Scotland, and Mr. Robert Byers, Area Egg Officer, Glasgow. Mr. Dick, who will be responsible for the administration of the Egg Control Scheme throughout Scotland, will be stationed at 3, Castle Street, Edinburgh. Distribution matters hitherto handled at Glasgow will continue to be dealt with at 38, Bath Street, Glasgow.

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Lieut.-Gen. Sir Maurice Grove-White, K.B.E., C.B., D.S.O., has retired from his appointment as Director of the Cocoa, Chocolate, and Sugar Confectionery Division, Ministry of Food.

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Mr. R. J. N. Clean, O.B.E., has been appointed Acting Director of the Division with effect from November 1, 1947.

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Professor J. A. Scott Watson, C.B.E., LL.D., has been appointed Chief Scientific and Agricultural Adviser to the Ministry of Agriculture and Fisheries and Director-General of the National Agricultural Advisory Service.

Milk Production in North America

RECOMMENDATIONS TO BRITISH DAIRY INDUSTRY

The Report* of the mission consisting of Mr. H. S. Hall and Mr. A. Rowlands of the National Institute for Research in Dairying, which visited North America in the summer of 1946 to study the technical aspects of milk production, has now been published. During the tour, which covered the great dairying states of the U.S.A., and included a short visit to Canada, members of the mission were able to investigate at first hand methods of milk production and handling and to talk with representatives of all sides of the dairy industry in North America.

The report emphasises that the element of competition is a powerful factor in maintaining a high quality in American fluid milk supplies. Production of milk in the U.S.A. is about ten times as great as that in England and Wales, and as only half is required for liquid consumption, only the better 50 per cent. of the producers are engaged in supplying this market. Municipalities are enabled to make a selection of producers by imposing very high standards for milk supplied in their areas, and these standards, which often impose exacting requirements as to the environment in which the milk is produced, have had the effect in several areas of eliminating smaller producers from the fluid milk market. There is no exception to the requirement that milk to be consumed raw shall be from tubercle-free herds, and some ordinances require that such herds shall also be abortus free.

Although there are many differences in the requirements imposed by States and municipalities, the members of the mission found that methods of milk production follow a more or less uniform pattern. An interesting feature is the extensive use of the dry floor technique in cowsheds where bedding is used in the gutters and standings to absorb liquid manure, and floors are kept dry by dusting with lime, superphosphate, or sawdust. This technique appeared to have much in its favour as a means of keeping floors clean where sewage disposal was difficult and water supplies inadequate. The use of milk houses in which the milk is cooled and utensils washed or sterilised is a universal requirement throughout North America, while great emphasis is placed on an adequate water supply, an important factor in maintaining the high standard of quality of fluid milk supplies.

Because of the higher temperatures which prevail during summer in America producers have paid particular attention to efficient methods of cooling and transport of milk and in particular the report discusses the churn immersion method of cooling which has the advantage of providing a convenient method of cool storage. Transport arrangements have been made with a view to restricting bacterial proliferation to a minimum; the haulage agent usually loads direct from the immersion cooler or cold store into insulated or covered trucks, and milk from producers supplying the larger cities is first taken to country cooling stations in order to reduce the haulage distance of producer's milk in churns.

The report points out that the American producer with these facilities at his disposal has a much easier task than his British counterpart in producing milk of high quality.

The latter part of the report gives brief descriptions of the various types of equipment at the disposal of the American producer, including milking machinery, milk cooling equipment, steam sterilising equipment, and washing and water heating equipment. It also includes an account of the Rural Electrification Administration, which by bringing electricity supplies to outlying farms has in the authors' opinion played an important part in assisting the production of milk in North America.

Amply illustrated with photographs, the report contains a summary of recommendations and suggestions, which should prove of interest to all who are engaged in, or interested in, the production of milk in Great Britain.

* *Technical Aspects of Milk Production in North America.* H.M. Stationery Office. Price 2s. net.

South African Loan

Details of the food to be imported from South Africa under the South African Loan Agreement, which provides that the United Kingdom will import £12,000,000 worth of food a year from South Africa during the next three years, are now available.

The commodities and their values are as follows:

	F.o.b. £'000
Group I.	
Citrus (oranges, grapefruit, lemons)	6,200
Deciduous—namely, grapes, pears, plums and apricots, peaches and nectarines. (The grapes account for well over one-half of the deciduous group.)	
Group II.	
Processed and dried fruit. (The products here are canned fruit, dried fruit, fruit pulp, fruit juices and jam and marmalade; of this the jam and marmalade may account for about two-thirds of the total value.)	2,600
Group III.	
Wine and brandy, and also concentrated grape juice or syrup required for further manufacture in U.K.	1,460
Group IV.	
High strength spirit (required for further manufacture in U.K.)	350
Group V.	
Canned fish (mainly snoek and crawfish)	870
Group VI.	
Eggs	220
Group VII.	
Pulses and potatoes ..	300
	£12,000

Information and Advice

Dry Cheese

B.2116. *Is there any method of restoring cheese that has gone dry and hard to its former state, and what is the best method of preventing this?* (London.)

We do not think cheese, presumably Cheddar cheese, which has gone dry and hard, can be restored to its former state without re-emulsification. There does not seem to be any reason why dried-up cheese should not be used for processing. A little more water would have to be used in order to obtain the original consistency and moisture content.

The only way to stop slices of cheese going dry is to maintain them in an atmosphere of high humidity, but the trouble is that this would encourage the growth of moulds. The simplest solution would be to spray the slices with an edible wax such as Okerin. The name and address of suppliers was given.

Cleaning Powders

B.2123. *Could you supply us with a formula for a cleaning powder for pots and pans?*

The following formula was supplied:

	Parts
Sodium carbonate	65
Borax	10
Soap	25
Ground silica	100

Cream Fillings

B.2157. *Can you supply us with a formula for filling cream in which gum tragacanth forms one of the ingredients?* (London.)

The following formula was supplied and should be considered as a basis for trial:

Compound fat	8 lb.
Sugar	8 lb.
Gum tragacanth	8 oz.
Water	8 pints
Butter flavour	
Vanilla flavour	
Egg colour	

The gum tragacanth is soaked in the water for at least twelve hours. The fat and sugar are creamed lightly, the gum is gradually beaten into the cream, the flavours and colours are added, and beating continued until a fine textured creamy filling results.

This cream can be used for filling sponges and other cream-filled products.

Information Supplied

B.2107. *Manufacturers of the "Iso" emulsifying agent.* (Middx.)

B.2110. *Suppliers of bottle and jar closures.* (Staffs.)

B.2112. *Suppliers of an automatic vacuum filling machine and of a machine used in bacon factories for removal of the blade bone from the shoulders.* (Eire.)

B.2113. *Manufacturers of a meat loaf wrapping machine.* (Perth.)

B.2117. *Literature in connexion with herb growing and processing.* (Australia.)

B.2118. *Recipe for aspic jelly suitable for glazing fish fillets.* (Devon.)

B.2119. *Suppliers of plant for shredded beef suet production.* (Lancs.)

B.2120. *Manufacturers of machinery for coffee making.* (Lancs.)

B.2121. *Suppliers of dehydrated potatoes.* (Northumberland.)

B.2122. *Ice cream manufacture using powdered gum tragacanth as a stabiliser.* (London.)

B.2124. *Suppliers of machinery for stamping tin lids.* (Cumb.)

B.2126. *British suppliers of arrowroot.* (Palestine.)

B.2127. *Literature dealing with the manufacture of lemon curd.* (London.)

B.2128. *Suppliers of jar caps.* (Yorks.)

B.2130. *Importation of glacé cherries.* (Hants.)

B.2131. *Manufacturers of pressure cooking vessels suitable for cooking batches of, say, 25 lb. wet fish.* (Lancs.)

B.2134. *Suppliers of paper jam covers.* (Denbighshire.)

B.2135. *Suppliers of colonial spices and essences for foodstuffs, cocoa, and resins.* (London.)

B.2137. *Cube compressing machine manufacturers.* (London.)

B.2145. *Recipes for custard powder.* (London.)

B.2147. *The manufacture of potato crisps, peanut butter, and roasted peanuts.* (South Africa.)

B.2150. *Suppliers of maltose syrup, sweetened fruit juices, and glyceryl monostearate.* (Lancs.)

B.2151. *Manufacturers of a small mixing machine suitable for mixing starch pastes or flour-water mixtures of high viscosity.* (Ches.)

B.2152. *Suppliers of gluten suitable for the production of health bread.* (London.)

B.2162. *Suppliers of nobbing machines for sprats.* (N. Ireland.)

B.2164. *Literature dealing with the manufacture of mayonnaise and the pickling of cucumbers.* (Belgium.)

B.2170. *Manufacturers of cleaning machinery for the fruit and vegetable trade.* (Lancs.)

B.2173. *Manufacturers of a combined bread-cutting and butter-spreading machine.* (Somerset.)

B.2177. *Suppliers of liquorice root and extract, and cloves.* (N. Ireland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

589,336. National Oil Products Co.: Production of fat-soluble vitamin-containing concentrates.
589,339. Baker Perkins, Ltd., and Tunley, A. A.: Machines for depositing chocolate and the like.
589,344. Huzenlaub, E. G., and Rogers, F. H.: Process for the treatment of cereals.
589,366. Nowakowski, M. K.: Tea or like infusers.
589,373. Aktiebolaget Elektrolux: Absorption refrigerating apparatus.
589,509. Atlantic Coast Fisheries Co.: Fish filleting machines.
589,698. Baker Perkins, Ltd., and Palmer, A. R.: Preparation of flour for baking bread and the like.
589,740. Cole, M. A.: Device for unscrewing caps fitted to jars, bottles, and the like.
589,759. B.B. Chemical Co., Ltd., and Stuart, T.: Plastic material in form suitable for use for packing or sealing purposes or methods of making the same.

Abstract of a Recent Specification

Methods of Canning Meats

This invention relates to improved methods of canning beef steaks in the form of cuts or pieces of predetermined size, whereby the canned products maintain their original shape, size, and character, without crushing, matting, or disintegration, even when subjected to a complete canning and sterilising process.

The method comprises preparing a plurality of steak cuts of predetermined size, subjecting the cuts in the presence of fat to a preliminary heating sufficient to brown the exterior surface of but not to cook the cuts, preparing a meat stock gravy comprising meat juices, flour, and seasoning, introducing the cuts and a hot bath of the gravy into a canning container, closing and sealing the container, and thereafter subjecting the container to the action of sufficient heat to effect at least partial cooking or partial sterilisation of the cuts.

In order to preserve the size and shape of the pieces of meat, each piece may be separately wrapped, or partitioned from adjacent pieces, by insoluble barrier members, preferably of vegetable parchment paper.

After wrapping in the parchment paper, and while the steaks are still hot, they are placed or arranged in the can, which can has been previously filled to a predetermined extent, approximately one-third in ordinary instances, with a beef stock gravy at a temperature approximating the boiling point, or 212° F.

Vacuum sealing is unnecessary, although it may be utilised if desired. The sealed can is then placed in a retort in which it is subjected to a canning processing.

In use, as the cans are opened, the steaks may be unwrapped from their parchment paper coverings, and heated and served in the ordinary manner, with a suitable quantity of the covering gravy. As served, the steaks will have their identity preserved, and will have retained substantially their original size, shape, and texture, and will be possessed of the flavour and characteristics of Swiss steaks cooked and served in conventional manner. There will be no matting, disintegration, or hashing of the meat pieces.

587,702. *Henry Withers Kickweed Jennings.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

EASTERN BREEZE.—645,192. Tea. **Hilland and Stewart, Ltd.,** 69/75, Academy Street, Belfast, Northern Ireland.

GREEN VALLEY.—645,278. Canned meat products and canned soups. **J. Skrek and Co., Ltd.,** Canton Market, Cardiff, Glamorgan, Wales.

ONCE UPON A TIME.—645,424. Confectionery (not medicated). **J. Long, Ltd.,** 5, Bell Street, Whitchurch, Hants.

TWO MACS.—645,462. Flour. **Scroggie Bros. (Yeast), Ltd.,** 4, North Road, London, N.7.

WONDERLAND. — 645,767. Flour. **Thomas Scott and Sons (Bakers), Ltd.,** 130, Knowsley Road, Bootle, Liverpool.

FISAGES.—646,251. Fish preparations for food for human use. **Gordon William Fenton,** Chylehan, Marazion, Cornwall.

ANCHOR SAUCE.—648,264. **Pure-fruit Preserving Co., Ltd.,** 49-57, Marsh Road, Middlesbrough; Manufacturers.

New Companies

Frigidfruits, Limited. (435585.) To carry on bus. of preparers, freezers and distributors of fruit and vegetables, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: W. A. Bennett and G. McGregor, Neptune House, Water Lane, E.C.1; J. Muirhead. Offices and Factory: Cleethorpes, Lincs.

Standard Development Company, Limited. (435545.) Church Street, Chiswick, W.4. To exploit and develop patents and inventions connected with fermentation processes, etc. Nom. cap.: £100 in £1 shares. Dirs.: A. J. C. Olsen, J. E. Sawtell, J. O. Lawson and R. A. Sawtell, addresses not stated. Subs.: E. T. Grubb (solr.) and Patricia D. Webb (secy.), Farleigh House, Lawrence Lane, E.C.2.

Milnes and Fletcher, Limited. (436823.) 1, Cater Street, Bradford. To carry on bus. of packing-case and crate makers, etc. Nom. cap.: £20,000 in £1 shares (5,000 cum. pref.). Dirs.: W. Milnes, Clinton, Moorfield Road, Ben Rhydding, Ilkley; J. P. Fletcher, 2, Tower Road, Shipley.

E. Garcia Castello (London), Limited. (436946.) 15, Broad Court, Covent Garden, W.C.2. To carry on bus. of importers and exporters of and dealers in merchandise of all kinds, including fruit, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: to be appointed by subs. Subs.: A. Manheimer, 15, Broad Court, Covent Garden, W.C.2; G. S. Davis, 200, High Holborn, W.C.1.

P. W. Heyman (London), Limited. (436896.) Bridge Road, Southall. To carry on bus. of manufacturers of and dealers in butter, margarine, cheese, milk, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: E. Heyman and Ebbe Heyman, Redlands, South Holmwood, Surrey.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.